

COAL AGE

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Which?

BY BERTON BRALEY

Written expressly for Coal Age.

Shall it be Peace or War? Reason—or Force?
Which is the course?
Shall doubt, dislike,
Avarice, blindness—grow to Wrath and Strife?
Shall weeks and months be rife
With all the bitter conflict of a strike,
Or shall the Masters and the Men, grown wise,
Have done with prejudice and craft and lies,
And seek the way of patience and of Peace,
That Labor wars may cease?

We are so weary of the constant fight,
So sick of labor struggles in the land,
So burdened with the wastage and the blight
Wrought by the minds that WILL NOT understand,
That we cry out to Capital, "Be sane,
Not grim, relentless, with a heart of greed,
But open-minded, willing to concede,
To compromise—and save a world of pain."
And so we pray to Labor, none the less,
"Let us be through with selfish stubbornness,
Which means so much of hardship and distress,
Let us have peace—the peace we've hungered for,
We are so tired of War!"

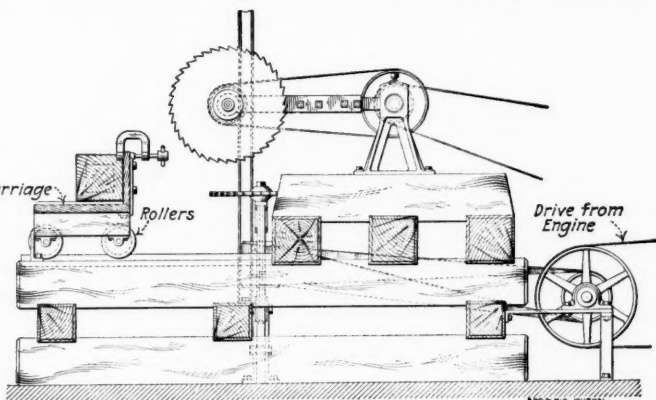
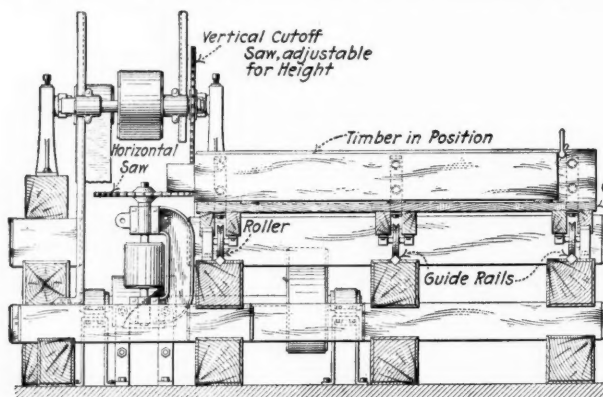
What is the answer, brethern; shall the mines
Lie idle and the country lack for coal
While want and destitution stand for signs
Of sternest struggle—or shall men control
Their battle spirit and with mutual trust,
Seek only to be just?
Shall it be Peace or War?

Ideas and Suggestions

Small Timber-Framing Plant

BY FRANK M. LELAND*

About two years ago, we found ourselves in the position of a great many medium-sized mines. We needed a large quantity of square sets and had been doing the same as most mines of this size, viz., cutting trees, hauling them in full length and dumping them in our timber yard, paying for them by the linear foot. We kept five or six timber framers working under a shed and they would go out and select timbers to suit, saw them off with a two-man crosscut saw, roll them under the shed, hew one side flat with a broadax and then get out a little gage, mark off the ends and proceed in the usual manner to saw them part way in and frame the ends as required.



THE HOME-MADE FRAMER, SHOWING BED, CARRIAGE AND JAWS

By the time they had ground up their tools and filed their saws, filled their pipes and lighted them, gone into the boiler room in winter to warm their fingers and performed a few other functions that every mine manager is familiar with, these hand-framed timbers had cost us a great deal of money. Up to two years ago, we had not required so many and we did not notice the expense so much, but when I found that we required a great many timbers, I began looking around for machinery.

The first thing we considered was a regular timber framing machine, but found on getting prices that one would cost from \$2500 to \$3000, weigh about 9000 lb., and require a 50-hp. engine and boiler to drive it and then it would only cut the tenons on the ends.

I figured the cost of a building and all the machinery erected, and found it would approximate about \$7000, which, for the work we had to do, was too large an investment. So I thought I would buy a slabber and a swinging cut-off saw and rolling the timbers to the cut-off saw, cut them in lengths to suit, and slab them on one side in order to get a starter for hand work. I purchased the slabber, complete with saw and the swinging cut-off saw for \$420. We erected it at the smelting

plant and cut off and slabbled a lot of timbers, but it proved a disappointment; the timber framers rather resented our taking their work away from them and in the usual well known manner, they made the finished timbers cost about as much as before.

I then began to figure how I could take the machinery and frame the timbers; the drawing illustrates how we did it. I built a frame of 8x8-in. timbers and laid the cut-off saw frame horizontal instead of vertical. I rustled up an old vertical 7x10-in. engine and connected is as shown, using channel irons with slotted holes so that the saw frame would move up and down, cutting any depth desired, or could be lowered clear down and used to square the timbers.

I then rigged up another saw running horizontally.

This does not cut at the same time as the vertical saw, hence only power enough is required to drive one saw at a time. The design is not beautiful, it was made without drawings, and figured out as we went along. The guide rails under the table are made from 1½-in. square iron set edgewise; the rollers we turned out of some old matte pans; the pulleys and shafting, we picked up around the place. The machine is strictly homemade, but it is good and strong and it runs perfectly.

METHOD OF OPERATION

The posts are first sawed on the slabber, they are next squared on the ends by running through the machine, say one hundred of them, the saw is then raised up so as to cut just 2 in. deep. The horizontal saw remains stationary, the stick is shoved through and the cut made on top, the carriage is then shoved on the horizontal saw and a slice taken out of the bottom; it is then pulled back and rolled over one quarter and the operation repeated; it requires four cuts to finish the end.

I have repeatedly timed it and find that it averages 3½ min. to frame both ends of an 8x8-in. post. The slabbing saw takes logs up to 8 ft. in length and when we received it, we made a set of dogs and some perforated plates to hold pins, and bought an inserted tooth saw to replace the thin saw which came with it; it is surpris-

*Mr. Leland wrote this article when president of the Empire Copper Co., Mackay, Idaho. He is now general manager of the Balaklava Copper Co., Coram, Calif.

ing how fast we can rattle out the timbers. When we started, all we hoped to make was square-set timbers, but we found that by getting logs 8 ft. long, we could make our lumber for just about one-half its cost when purchased from the saw mills. We found also that we could saw 2x4-in. stuff for ladders, 4x6-in. for flooring for the square sets, in fact, almost anything up to 8 ft. long, and we find that 2x12-in. by 8-ft. lumber is just as good for chutes, etc., as is 16-ft.

We rigged a little wedge saw to use up the scraps and find that our wedges cost us $\frac{3}{8}$ ¢, whereas, made by hand, they cost us 6¢. We also make ladder rounds $2\frac{1}{2}$ in. square by 16 in. long, ripping them on the small mill. We find many advantages which we did not think of at the start. The principal one is the fact that from every timber we get four slabs, two of which are generally good for lagging and in almost every case we get enough lagging from the timber to pay for the timber itself, since we would have to use 2-in. plank, if we did not have this lagging. Furthermore, the boiler being purposely left naked, warms up one end of the shop and for the other we use live steam in coils of pipe; the fuel costs nothing, since we burn the saw dust. This is quite an item, as it ordinarily takes from 300 to 400 lb. of coal daily to keep the shop warm.

Finally, these machine-framed timbers can be erected in the mine at a lower cost for labor than the hand-framed, since they are all true and fit exactly.—*The Engineering and Mining Journal*.

A Simple Philosophy of Life

Written in a scrawly hand on a piece of paper, since grown grimy, the following lines grace the inside of a closet door:

In the adage good and old,
We forevermore are told
That it's better far to give than to receive.
So the boost that always lends
Helpful thoughts to troubled friends
Is that bread cast on the water we retrieve.

The stanza gains significance with additional facts. The closet just mentioned is a fixture in the hoisting-engine room of a large coal-mining operation. Its contents range from cotton waste and brightly polished oil cans to a change of clothing and a dinner pail. The only man having access to the lock is the hoisting engineer, who, for obvious reasons, we will call "Smith"—and thereby hangs the pith of that which follows.

Smith has admitted, modestly to be sure, that he is the propounder of the above verse.

It bears a positive relation to Smith's attitude toward his daily work. He expresses his simple philosophy of life in the language of action. If you watch him operate the hoist, you will note the pleasure on his face as he throws his levers with the precision of a faultless mechanism. His answer to a fellow workman is always of the kind which promotes harmony. He has learned the knack of self-effacement.

A glance at Smith and you can discern a mixture of the milk of human kindness and a thoughtful determination that would guard safely any confidence you might impose in him. Being more or less a child of fancy, he has cultivated the habit of introspection and therefore tries to see himself as others see him.

Smith's daily work includes business flavored with

action, a friendly boost or perhaps a josh. And his work has found him out, for his employers recognize him as a leading spirit.

In a word, Smith firmly believes that appearances dominate feelings; to be happy one must smile.

If "nothing succeeds like success," how doubly true it is that nothing fails like failure. Most of us take our views of life from the atmosphere in which we live, but all of us are endowed with ambition.

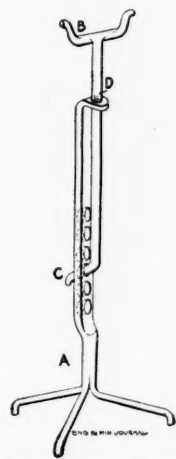
Neither success nor failure are dealt out with a single turn of fortune's wheel. The success we all crave is the result of untiring effort, and the only foundation on which it will thrive is kindness to our fellows.

From an ambitious viewpoint kindness is a paying investment. Don't knock, boost, and your boost will find you out.

In one sense Smith is a gifted man, and though we are not all of his temperament, we can at least apply his remedy for a discouraged spirit. It is equaled by none. Try it—*Smile and be happy*.

Blacksmith Stand

The rest illustrated is of simple design and inexpensive to make; it will be found useful for holding up light work in the machine shop or smithy (*American Machinist*, Jan. 29, 1914). It consists



STAND FOR SUPPORTING BARS

of a standard A, which has three feet, and of a rest B. The rest is adjusted to the desired height by putting its lower end C through one of the holes in A. These holes are bored or punched about $1\frac{1}{2}$ in. apart, and should be made at an angle, as shown by the dotted lines, so as to insure a safe hold of the shank when weight is placed upon the rest B. The hole in the head of the standard marked D through which the shank of the rest slides up and down, must be made large enough to allow for the movement of the shank when the point C is being taken out, or being put through any of the holes in the standard A.

Owing to the improved methods, seams of coal have been worked in Britain at a depth of 3000 ft., and in one mine in Lancashire, 3700 ft., which means a natural temperature of over 90°. The method of ventilation has been improved, and Sir W. E. Garforth believes those who are now studying will perfect in years to come a small fan for each coal face, in order that the miners may obtain an increased velocity of air—utilizing the fan in much the same way we all use fans on a hot summer's day.

A new system of signaling has been instituted at the Windsor colliery, in South Wales. They are endeavoring to abolish all electric signaling, and have devised a scheme of signaling with blast hooters, which have been put on every main-haulage engine on the east side of the colliery. The hooters are attached to a compressed-air column, and this is said to operate successfully. The pulling of a wire which runs along the roadway gives the signal to the engineman. It is said there is absolutely no danger of sparking with the new system.

The I. & S. C. M. Co.'s Plant at Issaquah, Wash.

By L. S. RICHARDS*

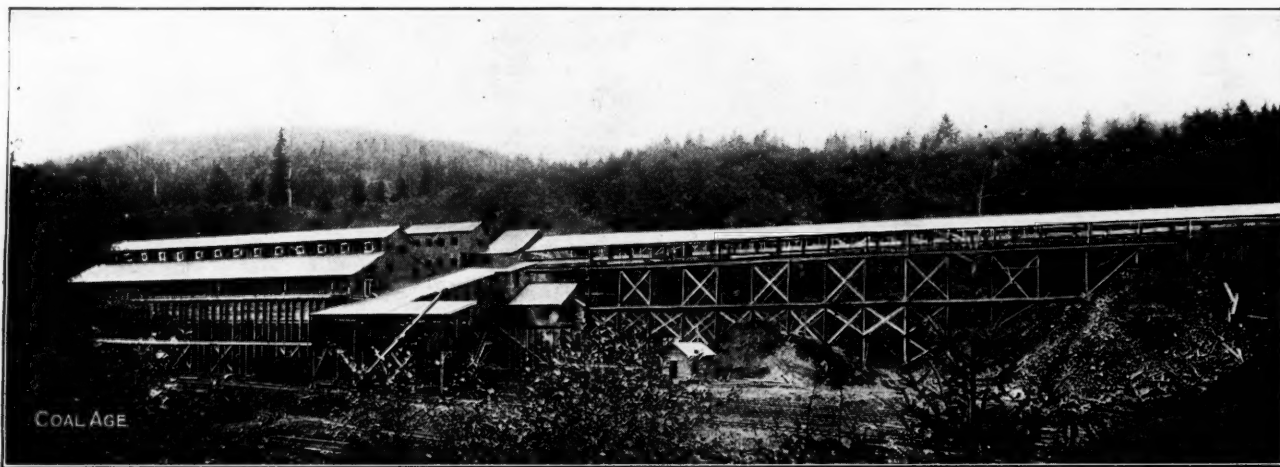
SYNOPSIS—Description of an unusually effective installation for handling and treating the low-grade Pacific Coast fuels. The coal is carefully sized and both hand picked and washed. A new method of screening, termed a "flexible hanger shaking screen" was installed; although common to the anthracite fields this is the initial installation of this apparatus on the Pacific Coast.

The Issaquah & Superior Coal Mining Co., of Seattle, have recently completed a plant at Issaquah, Wash., for the preparation of lignite coal which is of especial interest because it is the most modern and complete of its kind on the Pacific Coast. The design of the entire plant was made and the machinery furnished by the Link-Belt Co., of Chicago, and the plant was erected and put in operation under the supervision of their engineers.

The empty is forced through the tippie by the oncoming car and passes, by gravity, to a kickback which reverses its direction and switches it to the empty track, where it is stopped by a track brake. Here it is picked up by an inclined car haul and elevated to a height sufficient to allow it to pass by gravity back to the mouth of the drift.

SCREENS AND PICKING TABLE

The tippie discharges the coal into a hopper so arranged that the coal is eased down into it with practically no fall. This hopper is provided with a flop gate so that when rock is dumped it can be passed to the rock bin, located directly below it. The coal is fed uniformly from this hopper by a reciprocating feeder to a pair of shaking screens, the upper screen having 4-in. round



GENERAL VIEW OF TIPPLE AND WASHERY

TIPPLE ARRANGEMENT

The coal is received from the mine in two-ton cars, being handled from the mouth of the drift in trains of 30 or 40 cars by an electric locomotive over a covered trestle about 700 ft. long. The cars are passed singly by gravity, over a track scale to a power-driven revolving tippie, a car stop being located between the scale and the tippie which enables the operator to regulate the cars going into it.

The revolving tippie consists of a structural-steel framework carrying a pair of rails for receiving the cars. This framework is supported at the ends by cast-steel rings which are carried by a pair of roller shafts on which the tippie revolves. The power for operating is received through one of these shafts, which is constantly revolving. The working of the tippie is controlled by means of a lever system through which the operator lifts the rings slightly out of contact with the driving rollers upon the completion of a revolution. This lever system is so arranged that the tippie is automatically stopped without the slightest jar.

perforations and the lower $2\frac{1}{2}$ in. These screens separate the coal into 4-in. lump, $2\frac{1}{2} \times 4$ -in. egg, and $2\frac{1}{2}$ -in. slack.

The lump and egg coal are separated only for convenience in picking, each passing to an independent picking table, of which there are two. These tables discharge onto one loading boom which delivers the coal to the railroad cars. The tables are of the flat-top apron type and are of ample width so that the coal is spread out thinly, although the apron moves at only 50 ft. per min. The pans form a perfect circle around the head wheel which permits of the discharge chute being set high up to eliminate the fall of the coal at this point without allowing any leakage of the fine coal, since the chute may be set close to the pans.

The loading boom is of the corrugated apron type, which offers a maximum resistance to the sliding of the coal. It is provided with small diameter wheels at the discharge end, thus minimizing the drop of the coal into the car. The raising and lowering of the loading boom is accomplished by a worm-gear winch, power-driven and controlled by a set of bevel friction gears.

The rock and refuse, which are picked from the lump

*Engineer, with the Link-Belt Co., Chicago, Ill.



DRAINING AND SIZING SCREENS FOR WASHED COAL



INTERIOR OF WASHERY, SHOWING LINK-BELT JIGS

and egg coal, are passed, by means of chutes, to a double-strand flight conveyor, located below the picking floor which discharges into the rock bin. The pieces of coal which have rock or clay attached to them are passed by the pickers to a single-strand flight conveyor alongside the rock conveyor. This delivers it to a spring relief crusher, which crushes it to $2\frac{1}{2}$ in. and under.

A FLEXIBLE HANGER SHAKING SCREEN

The slack coal through $2\frac{1}{2}$ in. from the lower shaking screen passes to a gravity-discharge conveyor which distributes it over a 500-ton raw-coal storage bin. This conveyor is arranged so that the return run passes underneath the bin and the coal is reclaimed by being fed into this run through slide gates, and elevated to a 100-ton raw-coal bin in the washery. The coal and rock from the crusher are also fed into this run of the conveyor and carried to the washery. The slack coal in discharging into the washery bin, passes over a flexible hanger shaking screen with $\frac{3}{4}$ -in. round perforations from which it is delivered to two compartments, one for $\frac{3}{4}$ -in. slack and one for $\frac{3}{4} \times 2\frac{1}{2}$ -in. nut, each of 50 tons capacity.

This flexible hanger shaking screen is somewhat of a novelty in this part of the country, although extensively used in the anthracite fields of Pennsylvania. The sides are of 3x6-in. pine timbers and the connecting-rods 3x6-in. ash, rigidly attached to the side timbers. These connecting-rods are dressed down in the middle portion to a section of about 3x3 in. The hangers are 1x6-in. ash boards rigidly attached to the screen and to the supporting timbers. The screen is run at a more rapid rate than the ordinary shaking screen, and this together with the sharp action given by the spring in the hangers and connecting-rods, makes this apparatus most efficient in screening fine coal. It is more effective, and there is less breakage than with a revolving screen.

SYSTEM OF WASHING

The coal is fed from the bottom of these bins through vertical slide gates to the washing jigs, the slack going to a Link-Belt three-compartment Foust jig, and the nut to a Shannon jig. The washed coal from each of these jigs passes to an independent settling tank and from there into a Luhrig type elevator. The nut coal is delivered



REVOLVING TIPPLE AND CAR STOP

to a shaking screen with $\frac{3}{4}$ -in. round perforations where it is resized and sprayed with fresh water and delivered to a single-strand flight conveyor. This conveyor distributes it to the washed-coal bins. The undersize coal, together with the spray water from this screen is sluiced to the Foust jigs where it is rewashed with the slack coal. The washed slack from the Luhrig elevator discharges onto a pair of shaking screens where it is sprayed with fresh water and graded into pea through $\frac{3}{4}$ in. and over



EGG- AND LUMP-COAL PICKING TABLES



DISTRIBUTING CONVEYORS FOR WASHED FINE COAL

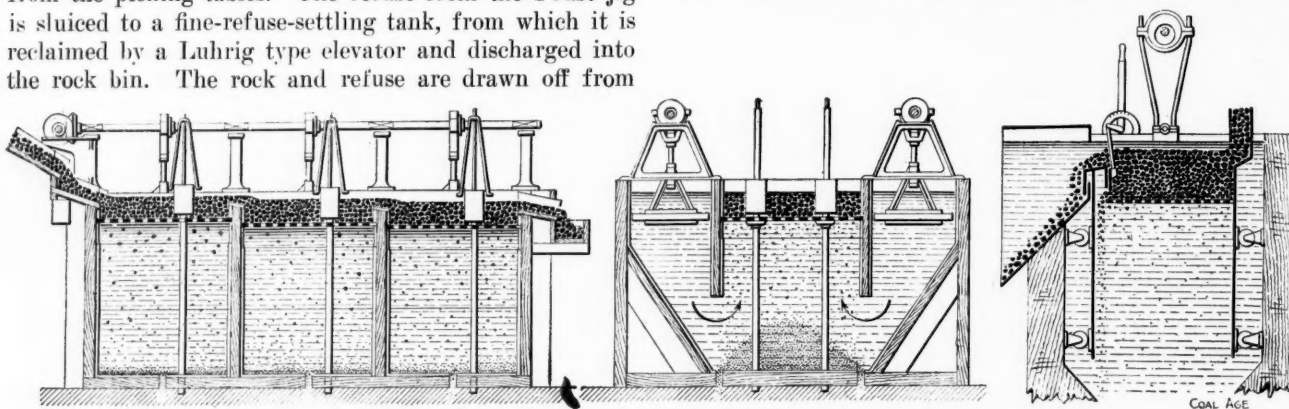
$\frac{1}{4}$ in. and buckwheat through $\frac{1}{4}$ in. and over $\frac{1}{8}$ in. The buckwheat is distributed to the bins by means of gates in the shaking screen and the pea coal passes to a single-strand flight conveyor which distributes it to the bins. These washed-coal shaking screens are all of the flexible hanger type, as described above.

The refuse from the Shannon jig passes into a Luhrig type elevator and is discharged into the rock conveyor from the picking tables. The refuse from the Foust jig is sluiced to a fine-refuse-settling tank, from which it is reclaimed by a Luhrig type elevator and discharged into the rock bin. The rock and refuse are drawn off from

and clear of the drip from the gates. The overflow water from all the tanks passes to a pump box from which it is drawn by a double-suction centrifugal pump supplying water to the jigs. The fresh water is supplied by a two-stage centrifugal pump from a near-by creek.

MACHINERY EQUIPMENT

The machinery is driven by 220-volt, three-phase, 60-cycle induction motors, there being ten all together



TWO TYPES OF JIGS (FOUST AND SHANNON) USED IN WASHING COAL

the rock bin through two undercut gates in the bottom and loaded into a gable-bottom refuse car of two tons capacity. This car is hauled up an inclined trestle by a wire rope operated by a friction drum and by means of a special tripping device it is dumped at any desired point along the trestle.

The washed-coal bins are provided with horizontal slide gates and hinged chutes for delivering coal to the railroad cars. The chutes are so arranged that when not in use they may be drawn up into a horizontal position

throughout the plant. The power is supplied by the Puget Sound Electric Co. from their plant about 15 miles distant; it comes in over high-tension lines, and is

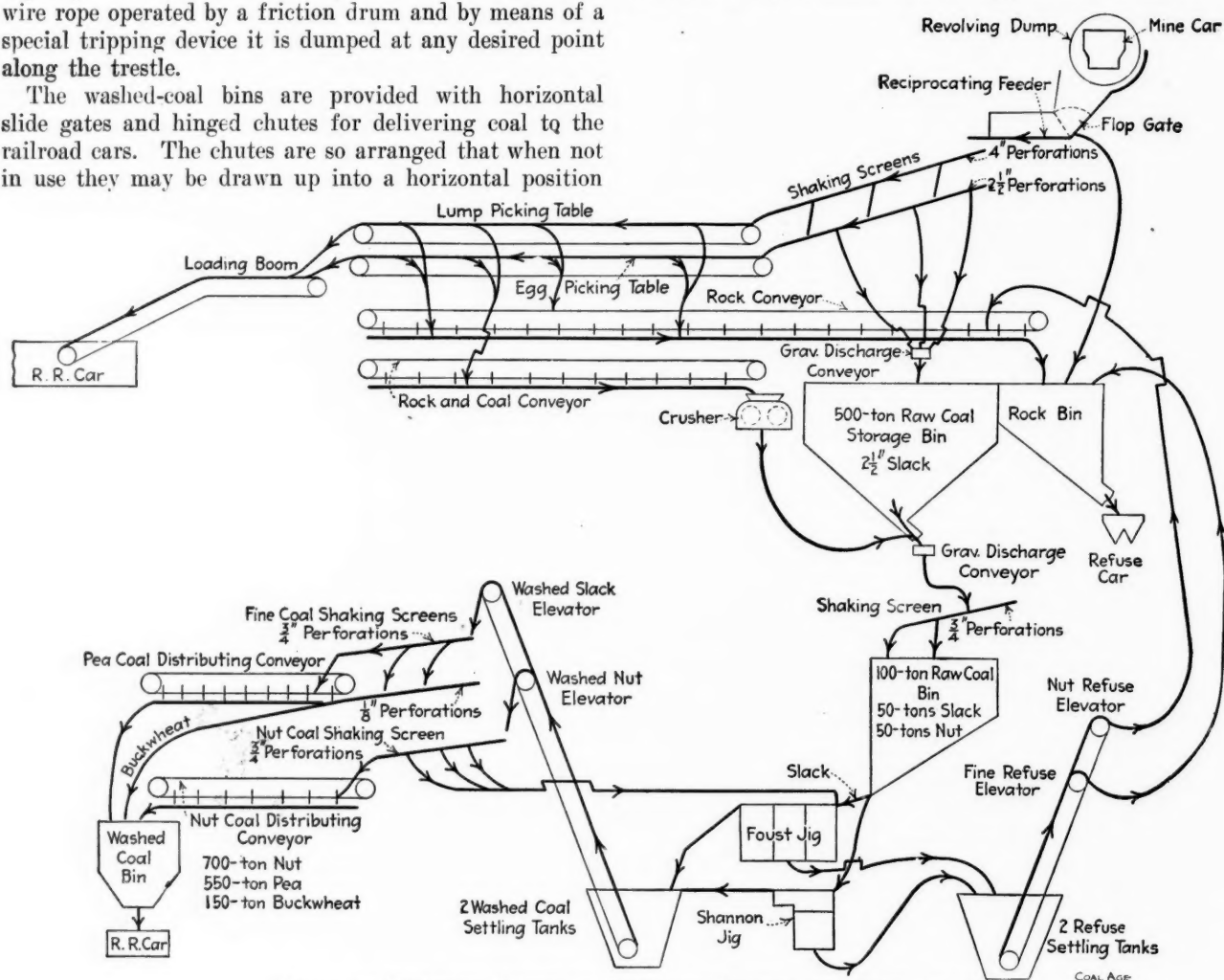


DIAGRAM SHOWING PATH OF COAL AND REFUSE THROUGH PLANT

transformed at the plant. The machinery supports, tanks, bins and building structure are of No. 1 Washington fir throughout, and the utmost care has been taken in framing to make a thoroughly workmanlike job. The roofing and siding are galvanized corrugated iron.

The coal is loaded out on two tracks, the lump and nut on one, and the pea and buckwheat on the other. There is also an arrangement of conveyors whereby nut can be stored in the pea-coal bins if desired and loaded out on the pea track. The nut-coal storage capacity is 700 tons, the pea coal 550, and the buckwheat 150 tons.

The lump coal is loaded direct to the cars as previously explained. The plant will handle cars from the mine at the rate of 200 tons per hour, and the washery will handle the $2\frac{1}{2}$ -in. slack at the rate of 90 tons per hour.

This plant has now been in operation about four months and Issaquah has already become famous for the high-grade quality of the prepared coal which it is supplying to the trade. The plant has more than fulfilled the highest expectations of the engineers in charge and promises to revolutionize the coal industry on the Pacific Coast in some respects.

The Air Factor in Mine Explosions

By JOHN VERNER*

SYNOPSIS—Quotes the statements of the British Explosions in Mines committee, contained in their recent report, to show the necessity of determining those factors affecting the rate of combustion of coal dust in suspension in mine air, since it is the rate of combustion that determines explosion of the dust. The compression and disturbance of the mine air do not necessarily cause explosion of dust in contact with flame. The counter current a strong factor. Two experiments suggested, to be made in the Experimental Mine, at Bruceton.

The following important statement appears in the fourth report of the British Explosions in Mines committee:

In the combustion of gaseous mixtures, there is no well defined border line between inflammation and explosion, the two terms being employed merely to indicate differences in the rapidity of combustion. But in the burning of mixtures of coal dust and air, it appears possible, and indeed necessary, to draw a line of distinction between inflammation and explosive combustion.

Briefly, our view is that during an inflammation of coal dust (at all events, that of bituminous coals) the flame is propagated, largely, by the burning of gases distilled from the dust; whereas, during explosive combustion, the portion of each dust particle that aids in propagating the flame is burned as a whole, both the volatile matter and the fixed carbon being consumed.

In view of this statement, it becomes a very important matter to find the factor that determines the rate of combustion and to discover the process by which explosive combustion is produced. The position of the British committee, in this respect, is not clearly defined. The report states further:

When inflammation occurs and the flame proceeds along the gallery, the expansion of the gaseous products of combustion causes a movement of a column of air which is pushed forward in front of the flame. The opposition to this movement may be approximately calculated, for a smooth gallery, since it depends on the inertia of the air to be moved, or the velocity of the air pushed forward and the size of the tube. But in the roadway of a mine this opposition may be enormously increased by the irregularities and obstructions, which cause waves and eddies in the air. A cloud of dust so compressed burns with greater rapidity than in still air. The effect on the advancing flame is thus cumulative.

COMPRESSION AND DISTURBANCE OF AIR DO NOT DETERMINE EXPLOSION

This would permit the conclusion that the greater the compression and disturbance of the mine air, in the pres-

ence of flame that may come in contact with the raised dust, the more probable the occurrence of an explosion. But this does not seem to be the case, judging from the facts. The recent explosion in the Dawson mine, New Mexico, Oct. 22, 1913, was caused by the firing of a single shot. The occurrence of this great disaster, in which some 261 lives were sacrificed, shows that the dust was readily inflammable. For a long time prior to the explosion, all the shots prepared in this mine each day were fired at one time by electricity, after the men had left the mine, and no explosion resulted under this system. The practice of firing all the shots simultaneously has also been in use in some of the Utah mines for years; and, up to the present time, the results have been entirely satisfactory. The same appears to be true of the Oklahoma mines, where simultaneous firing has been the practice for some time.

It is admitted that explosions may occur under this method of simultaneous firing; but the fact that they have not occurred where this supposedly highly dangerous practice has been adopted, indicates forcibly that widespread concussion, causing a general suspension of the dust in the air, in every part of the mine, and the general compression of the dust-laden air, and giving ample opportunity for the contact of flame with the raised dust, are factors not sufficient of themselves to cause the explosive combustion of the dust.

Since the rate of combustion, other conditions being the same, depends on the amount of available air supply, explosive combustion, by which the several dust particles aiding in propagating the flame must be burned as a whole, requires a larger air supply than mere inflammation, which requires but a partial combustion of the dust particles. The report of the British committee states: "The expansion of the gaseous products of combustion causes a movement of a column of air, which is pushed forward in front of the flame." This is true, but it is also evident that the complete combustion of the dust, considered by the committee as necessary to cause explosive effects, cannot be obtained by driving the air and fuel supply continuously ahead and away from the flame.

EFFECT OF THE COUNTER CURRENT

My view is that explosive combustion of coal dust in a mine is produced initially and reproduced during the explosion's progress with the aid of a more or less pow-

*Late mine inspector, Charlton, Iowa.

erful dust-laden air draft that is especially active along the mine floor, moving in a direction opposite to the advance of the explosion. Evidence of the probable existence of this draft or "counter current," as I have termed it, in previous articles, in *COAL AGE*, may be readily found in the comment of the British committee on the effects of the sudden rise of pressure caused by explosive combustion in the Altofts gallery. "This sudden rise of pressure," the committee says, "about 50 ft. from the open end of the gallery, sends an impulse back toward the closed end where the pressure was previously comparatively low. That is to say, the impulse is traveling in an opposite direction to that of the inflammation."

A cursory analysis of the cause and effect of this reverse "impulse" shows that the low-pressure area near the closed end of the gallery and the contraction of the gaseous products of combustion determined the direction of movement; and the suddenly increased pressure was due to the resulting explosive combustion; while the dissipation of pressure in the workings toward the closed end of the gallery created another low-pressure zone, which, in turn, caused the rearward movement of the dust-laden air that had been driven ahead of the flame and compressed by the expansive force. The pressure curves prepared from the manometer records taken in the Altofts experiments and given in *COAL AGE*, Jan. 31, p. 207, show clearly that the sudden rise of pressure was followed by a correspondingly sudden decline, permitting the conclusion that the greater and quicker the reverse impulse sets in, the greater its magnitude and force.

In view of this fact, it is my opinion that as soon as the subsidence or contraction period begins after each explosive combustion stage, a dust-laden air draft starts to move toward the flame (this draft, naturally, being strongest along the bottom of the entry, and continues to move in an opposite direction to that of the flame, thus providing air and fuel for its propagation, until explosive combustion again takes place, when the draft movement is momentarily stopped, only to begin again as soon as the resultant fall of pressure occurs.

THE AIR FACTOR VS. DUST FACTOR

The recent discussion in *COAL AGE*, Vol. 3, p. 3, *et seq.*, regarding Reducing Ventilation When Firing, shows the existence of a belief among mining men that the presence of strong draft is a material aid in starting a dust explosion. On the other hand, it is asserted that even an unusually strong air current directed against the flame of a blownout shot has little or no influence in the enlargement and propagation of the flame. Some hold the view that the presence of the dust is the all-important factor, while others believe that the amount of available air supply, rather than the available dust, measures the magnitude of an explosion.

These conflicting views regarding the value and influence of the air and dust factors in mine explosions, show the necessity of definitely determining, as far as may be possible, which side of the controversy is right. This is all the more essential, because the establishment of the true facts in the case will undoubtedly hasten the final solution of the dust-explosion problem. In order that progress in this direction may be made and knowing that Doctor Holmes, of the Federal Bureau of Mines, invites suggestions that may prove helpful, I

take the liberty of offering the following as an experimental test to be made in the Bruceton mine.

A SUGGESTION FOR THE BUREAU OF MINES

In order to determine whether or not extensive inflammation and explosive combustion of suspended dust can occur under conditions restricting the power of the "reverse impulse" to induce a strong draft of dust-laden air in an opposite direction to that of the flame, I would suggest that means, similar to those used at Altofts and described in the Fourth Report of the British Explosions in Mines committee, be adopted, in the Bruceton mine, to produce the simultaneous suspension of coal dust along the entire length of the main entry, from its mouth to the face; and that two strong doors, made as nearly air tight as possible and well braced, be located in the air course, in by of and near the junction of the diagonal entry and the air course. Shale dust should then be spread along the sides and on the floor of the air course from these doors to the face of the entry. All the cross-cuts, but the one at the face, are to be stopped.

Just prior to making this experiment, the doors mentioned should be closed and locked in such a manner that considerable force will be required to open them, either in an outward or inward direction. In addition to the coal dust placed on the swinging shelves in the main entry, dust is to be spread on the floor and side shelves and in front of the cannon. The cannon is then to be placed at the mouth of the main entry, its muzzle pointing into the mine. The powder charge may be the usual one, $2\frac{1}{2}$ to 3 lb. of powder. The firing of the cannon must be simultaneous with the upsetting of the dust-laden swinging shelves along the entry.

Should this test be made and extensive inflammation or explosive combustion not be produced, I would suggest that another experiment be then made, under the same conditions, except that a stout door be erected at the mouth of the entry and that the cannon be placed just inside of the closed door and fired into the mine, as before. Should this test, also, fail to cause an explosion, that fact would demonstrate quite conclusively, to my mind, that a large dust cloud may be subjected to concussion, compression and the impact of flame without explosive combustion resulting therefrom. The absence of draft facilities will, I believe, prevent the comparatively unrestricted dust-carrying air movement in an opposite direction to that of the flame that supplies the air and fuel necessary to enlarge, renew, and extend inflammation.

Should these tests result in explosions, that fact will not affect their value in any way, for it has been demonstrated at the different experimental stations, that a change in the conditions surrounding the making of tests brings a change in the results; and it may reasonably be expected that, in any event, the suggested experiments, made under unusual and untried conditions, will bring out new facts and useful information.

It has been rightly said that the process by which explosive combustion of the dust is effected must be definitely known, in order to determine what means should be adopted for the prevention and limitation of explosions. The correct answer to the question, How does coal dust explode, has been sought for many years, but has not, as yet, been found. I believe there is more than a possibility that this answer may be supplied by making the experiments suggested above.

Longwall Mining in Kansas

BY BARRY SCOBEE*

SYNOPSIS—The lower seam in the Mineral field, south of Pittsburgh, has been practically exhausted. The operators are preparing to mine the upper seam by the longwall method. The writer describes some of the conditions encountered, and gives, in part, the scale agreed on in this connection.

Several important coal operators and the officials of District No. 14, U. M. W. A., recently agreed on a wage scale and terms for mining by the longwall method. This is something new in the district and even yet opinion is divided as to whether the room-and-pillar process

about 60 ft., while the old seam is nearly 200 ft. down. The upper seam is between 26 and 30 in. thick and is known to be six or seven miles wide. The length is a matter of speculation. The coal has no faults, is of good quality, and thus far, untouched. The current opinion is that it will profit the owners as much as the deep seam; and that it will be "the making of Mineral" if it is worked, for the town has been losing population by the miners going to the field north of Pittsburg.

J. H. Hibbens, of Parsons, representing the Missouri, Kansas & Texas; John Mayer, of Kansas City, a big operator in the district; William Barrett, on behalf of



A NEW MINE, CLEMENS NO. 4, NORTH OF PITTSBURG, KAN.



ANOTHER RECENT DEVELOPMENT, MINE NO. 19 OF WESTERN COAL AND MINING CO.

would not be better. The longwall method, however, is recommended more substantially.

The wage agreement was reached at Mineral, a town of 1500 people on the western edge of the coal field. This is an old field and practically all of the deep mines have been exhausted. The formerly important Missouri, Kansas and Texas shaft No. 8 is an example. The men have been quitting all winter, as they worked out their rooms.

There is, however, a shallower seam than the one these mines have taken out. It lies at an average depth of

the operators; and George Richardson, arbitrator for the operators, met with the district officials and spent several days in arranging the plans. These men represented parties who are interested in the Mineral field; and Mr. Mayer and the Missouri, Kansas & Texas have idle machinery now which they will use when the top seam is opened. The miners also have homes in Mineral which they must leave if it is not opened, so that everything is favorable. Mr. Mayer has stated that he will open the top seam in the immediate future.

This field, owing to the lower seam being worked out, is being deserted. The towns of Arma, Edison, Ringo, Franklin and Capaldo have sprung up in the field north

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of Pittsburg and absorbed miners leaving the south end. Within the past year or less the following mines have been opened in the north end: Wear, 1; Central Coal & Coke Co., 2; Western Fuel & Mining Co., 2; Sheridan Coal Mining Co., 2; Clemens, 2; and Pittsburg-Cherokee Coal Mining Co., 1. These mines are about 200 ft. deep and the coal is 36 to 40 in. thick. Most of the mines are dry and shotfiring accidents are common.

Following is the scale, in part, as arranged in the conference, for longwall mining, or, at least, for taking out the upper seam:

Loading price is 60c. a ton of 2000 lb., the coal to be free from all slate, dirt, bone, sulphur, blackjack and other impurities, and to be delivered to the working switch by the loader or miner.

and in the face of increased competition for the West Virginia seaboard coal traffic, which followed the completion of the Virginian and the Carolina, Clinchfield & Ohio, the Norfolk & Western has more than doubled its traffic in bituminous coal during the last five years, and the tonnage delivered to vessels at this company's terminal at Lambert's Point in the Norfolk harbor during 1913 was more than 46 per cent. of the total tonnage handled in this harbor. This heavy traffic made advisable the construction of a new loading dock which is not as long as several of those already in service in the New York harbor, but it has more spouts than any of the gravity or simpler mechanical devices and the same number as the combination dock of the Virginian. It is 22.3 ft. higher than the Virginian pier, and 21.1 ft. higher than its com-



AN OLD KANSAS MINE OF MISSOURI, KANSAS AND TEXAS CO., NEAR MINERAL, KAN.

The cutting price is 30c. per ton of coal undercut and loaded, and it will be divided 16c. to runner and 14c. to helper.

The following prices for brushing apply: For roadway 4 ft. 6 in. above the rail, per yd. \$1.56. Higher brushing in proportion. Where bottom-room brushing in rooms is required, it is to be paid for at the rate of 30c. per yd. for first 6 in., and 4c. for each additional inch.

Development in Coal-Loading Docks

An increase of about 20 per cent. in the tonnage of American railways furnished by the products of mines during the last five years has required the provision of elaborate terminals of special designs to handle the various classes of this low-grade traffic. Only six coal unloading plants classed as mechanical were in operation in Atlantic ports up to 1910, all of these being in New York harbor. One of the six was a belt-conveyor outfit, hoisting the coal from a track hopper to a height sufficient to allow it to be dumped into boats. The other five were all car-dumping machines located at a proper height to dump directly into boats, the road cars being pulled up in most cases by a barney. The remaining 50 docks located at the four Atlantic ports which load bituminous coal on ocean-going vessels were of the gravity type, the road cars being pushed or pulled to the top of a trestle on the pier from which the coal is dumped into boats.

In spite of the fact that more coal from the West Virginia fields is hauled to the Northwest since the acquisition of the Hocking Valley by the Chesapeake & Ohio,

panion gravity pier No. 3, at Lambert's Point, which formerly had the maximum capacity and the greatest height on the seaboard. The self-propelled pier cars are similar to those used on the Virginian docks, and have some common features with those used on the Canadian Pacific unloading dock at Fort William, but are of much greater capacity than either of the other designs.

By the replacing of one of the old gravity docks with this new combination mechanical gravity plant, the total rated capacity of the Norfolk & Western terminal was increased from 3150 tons per hour to 7875 tons per hour. The maximum capacity of a coal-loading dock must be greatly in excess of the average output on account of the necessity for loading large cargoes rapidly in order not to delay the vessels. In general, the output of the coal piers on the Atlantic coast averages about 30 per cent. of their maximum capacities, but the new pier at Norfolk could have loaded all the coal shipped from Lambert's Point in 1913 by working at its maximum rated capacity for only 13 hours per week. While the rating of 90 tons per minute for this pier is unusually high, it has been shown during the three months that the new pier has been in operation that it is not only capable of developing this capacity, but it has actually exceeded the rate for one dumper already, and probably will considerably exceed the total rate when both dumpers are put in service. —*Railway Gazette.*

Seams liable to spontaneous ignition should be worked by a method which facilitates the stopping-off of a district so that when a fire occurs the portion affected may be shut off without interfering with the rest of the mine. The panel system of working is best suited to such a seam.

A Triangulation Survey of the Fairmont Region

By A. W. HESSE*

SYNOPSIS—A description of one of the largest surveying projects ever undertaken in the coal industry. It involved precise control of a territory 90 lineal miles in length and comprising an area of 250 square miles. A description of both field and office methods employed.

In mapping immense tracts of land, before any of the ordinary surveys with transit and tape are made, it is necessary to secure control of the territory by primary, and perhaps secondary, triangulation surveys, if a high degree of accuracy is desired.

All the work of the United States Geological Survey is based on this system in obtaining the data for the construction of the geological and topographical maps and folios. In order to get the proper relation of points in various parts of the United States, astronomy is employed and determinations of latitude and longitude, in relation to Greenwich, are made at these points. Then they are connected by the primary triangulation survey. The astronomic determinations, being very accurately made, serve as a check on the primary triangulation survey made between these points. Then the secondary survey stations are located at shorter distances apart within the primary survey triangles, and are checked on the latter. The transit and tape surveys are then checked on the more accurate points of the secondary triangulation survey stations without running over excessive distances. Not much over two miles should be run without being "tied in."

METHODS OF TRIANGULATING

This is the system employed in the fabrication of the surveys of the Consolidation Coal Co., mentioned in my article in *COAL AGE* of Feb. 21, 1914, except that the astronomic determinations were omitted and the U. S. G. S. stations were used for checking the coal company's surveys.

Triangulation consists in surveying by triangles, the side of one forming the side of an adjacent triangle, as shown by A in the accompanying Fig. 1, in which the side BC , of the triangle ABC , is also the side of the triangle BCD and the side CD , of the triangle BCD , is also the side of the adjacent triangle CDE . Therefore, if the side of a triangle and the interior angles are known, the other two sides can be computed.

The first step then is to locate the points forming the adjoining triangles, so that clear sights can be obtained from one to the other. Next a base line is established, serving as a side of a triangle at each end of the system (and if the survey is long, an interior or intermediate base line), so located that they can be accurately measured. Then, in the accompanying figure, assuming AB and DE are measured and the interior angles known, when the other sides are calculated there will obviously be one common to each origin somewhere between, which will determine whether the work has been performed cor-

rectly. Or when the side DE is calculated, starting from AB , the result must be the same as obtained by actual measurement.

The maps shown in Figs. 2 and 3 are the triangulation survey made in the Fairmont Region for the Fairmont Coal Co. These surveys were started back in 1901 by H. V. Hesse, then chief engineer of the Fairmont Coal Co., and it was under his supervision that the bulk of the work was completed. Extensions to the main survey were made from time to time until the whole territory was controlled in 1909.

The properties now covered by this work are owned or controlled by the Consolidation Coal Co. In straight lines, the surveys extend over a distance of 90 miles, covering an area of about 250 square miles and requiring about 230 hubs or stations. These stations usually consist of a short bar or heavy rail, driven into the ground about three feet and the top center-punched. As

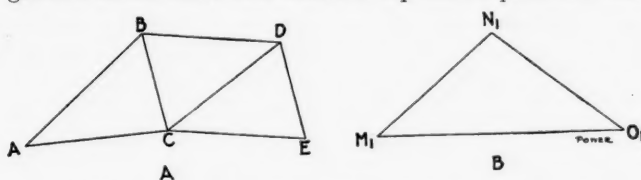


FIG. 1. SHOWING SERIES OF CONNECTED TRIANGLES

each station was established it was described in reference to nearby trees or other available objects of the most substantial nature.

The true meridian formed the basis of all the courses or bearings of this system and was established at Mine 56, near Watson. When this had been carried to the Government stations, it was checked against the bearings of the sides forming the angle at each station.

BASE LINES

Measurements of the base lines were made while the transit readings of the angles were being taken. The first two base lines measured are located at Beechwood and Ehlen, about 25 miles apart. The description of the measurement of one base practically describes all of the six lines measured.

The first step in the determination of the length of a base line is to standardize the tape; that is, find at what temperature and pull it is U. S. standard measure. The tape manufacturer can furnish this information or it can be compared with the steel tape duly certified by the Bureau of Weights and Measures, at Washington. The tape used on this work was standard at eight pounds pull and 62 deg. F., and was 300 ft. long.

There are certain variable factors which also enter into the measurement of a base. These are errors, due to difference in temperature and pull and difference in sags caused by the variation in pulls. Consequently, corrections must be made for the same.

In Merriman and Brooks' "Handbook for Surveyors," page 87, are shown the formulas we used, which are as follows:

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$$\text{temperature} = +e(T - t)l$$

$$\text{pull} = +s(P - p)l$$

$$\text{sag} = -\frac{1}{24} \left(\frac{wl}{nP} \right)^2 l$$

e = Coefficient of expansion;

s = Coefficient of stretch;

p = Standard pull;

P = Pull of measurement;

t = Standard temperature;

T = Temperature of measurement;

n = Number of equal spaces in l ;

w = Weight in pounds per lineal foot of tape;

l = Observed distance;

L = Mean adjusted distance;

Knowing the standard pull for the tape, the coefficient of expansion is determined by marking off accurately about 200 ft. on the floor of a large room, at the same time noting the temperature. This latter is then raised or lowered and the distance again measured and the operation repeated several times, the pull always being the same in each case. The change of length in each measurement is accurately observed and divided by the 200 ft.; this result is then divided by the difference in temperatures, in degrees, of the two readings. The result gives the coefficient of expansion. The several results are, of course, averaged and the mean adopted. The value obtained for the tape used was $e = 0.0000063$.

The next factor required, for use in the correction for pull, is the coefficient of stretch. This is necessary since the tape is used under different tension and the relative change in length for one pound pull must be determined. The operation is the same as that described for the coefficient of expansion, except in this case the temperature is maintained the same while the tension is varied. Then the coefficient of stretch is the difference in lengths divided by the total length, and that result divided by the difference in tension in pounds. In the coal company's determinations these pulls varied from 8 to 12; 8 to 16; 8 to 20; 12 to 16; 12 to 20, and 16 to 20 lb. The average result of these operations gave as the coefficient of stretch, $s = 0.000013645$.

FIELD WORK

As previously mentioned, the base line formed one side of a triangle, the stations being substantial hubs. The base line was first laid out in divisions of about the length of the tape, in this case 300 ft., and stout stakes set at such division points. These were all on line between the ends of the base. On each division stake was placed a sheet of tin on which a fine mark was made at right angles to the line of measurement. After the stakes were set, elevations were obtained on the tops, and more stakes were set dividing each division into equal subdivisions of 50 ft. This usually made n , in the given formula, equal to six. The subdivision stakes were likewise placed on line and small nails driven into the tops to keep the tape in position while measuring.

The Ehlen base line consisted of four divisions, each of which contained six subdivisions, except the fourth, which contained five of 49 ft. each. The entire line was measured five times; six measurements were made of each division three times and eight measurements of each division made twice, making a total number of 136 meas-

urements, of which 120 were used in calculating the line. The accompanying field notes will illustrate how these readings were taken and recorded for one division.

MEASUREMENT OF EHLEN BASE

12-11-01

Party	Temp.	Distance	Division IV	n = 5	3 p.m.
Kinkley Smort Jones Hames					
8 lb.	50°	245-12.45	= 243.963		
10 lb.	49½°	245-12.62	= 243.948		
12 lb.	49½°	245-12.50	= 243.958		
8 lb.	48½°	245-12.38	= 243.968		
10 lb.	49°	245-12.58	= 243.952		
12 lb.	49°	245-12.60	= 243.950		

Day clear

No wind

Spring balances were used at each end of the tape, one end of which was held stationary over the stake while the other was pulled until the proper strain was obtained when the reading was taken. In the above case, the 245-ft. graduation was a fraction more than 12 in. over the division length, the difference being read by an engineer's scale, graduated to fiftieths of an inch, making it possible to read to hundredths.

In a book, kept specially for the purpose, these measurements were rearranged and each division worked out by itself, as shown by the accompanying notes.

EHLEN BASE—DIVISION IV

ADJUSTMENT OF FIELD NOTES

Temp T F	Pull P Lb.	Observed Distance	Temp.	Corrections Pull Sag	Adjusted Distance
50°	8	243.963	-0.0184		243.911
49½°	10	.948	0.0192	+0.0067	.924
49½°	12	.958	0.0196	0.0133	.927
48½°	8	.968	0.0218		.913
49°	10	.952	0.0200	0.0067	.917
49°	12	.950	0.0200	0.0133	.929
42½°	8	.969	0.0296		.906
44½°	10	.952	0.0273	0.0067	.917
45½°	12	.938	0.0257	0.0133	.911
45½°	8	.963	0.0254		.904
45½°	10	.951	0.0249	0.0067	.912
47°	12	.935	-0.0230	0.0133	.911
70½°	8	.924	+0.0127		.904
69½°	10	.908	0.0115	0.0067	.905
69½°	12	.902	0.0119	0.0133	.912
69½°	8	.931	0.0115		.909
70°	10	.915	0.0123	0.0067	.913
70½°	12	.898	0.0134	0.0133	.910
74°	8	.929	0.0184		.914
73½°	12	.898	0.0177	0.0133	.914
74°	16	.881	0.0184	0.0266	.918
73½°	8	.930	0.0173		.914
73½°	12	.898	0.0173	0.0133	.914
72½°	16	.879	0.0165	0.0266	.914
73½°	8	.931	0.0173		.915
73½°	12	.901	0.0181	0.0133	.918
73½°	16	.881	0.0177	0.0266	.917
73°	8	.933	0.0169		.917
73½°	12	.900	0.0173	0.0133	.916
73½°	16	243.881	0.0173	0.0266	243.917
Mean observed distance = 243.926					
n = 5 h = 0.377 ft.					
Mean adjusted distance = 243.9141					
Final horizontal distance = 243.9138					

These notes give some idea of the variations in measurements caused by a difference in temperature and pull. It will be noted that the average of the observed distances is 243.926 ft. Taking this as l and substituting in the formulas for corrections heretofore given, they reduce to

$$\text{correction for temperature} = +0.0015367 (T - 62)$$

$$\text{correction for pull} = +0.0033284 (P - 8)$$

$$\text{correction for sag} = -\frac{2.12595}{P^2}$$

Where the pull equals 8 lb., the correction for pull reduces to zero and the algebraic sum of the corrections and observed distance gives the adjusted distance. After all the adjusted distances were worked out, the average of the results was taken as the final adjusted distance, in this case being 243.9141 ft. The difference in elevation between the hubs of this division was $h = 0.377$ ft. Therefore, taking the square root of the difference of the squares of the mean adjusted distance and the difference of elevation, we get the final horizontal distance, 243.9138

ft. ($\sqrt{L^2 - h^2}$). Thus each division of the base was worked up and the sum of the distances gave the final length of the base line.

All of these calculations were worked out by naturals in duplicate to avoid the slightest possible error. Copying and recopying were always checked and marks indicating that results were correct had to show this fact.

ANGLE OBSERVATIONS

The observations of the angles of all the triangles are illustrated at *B* in the accompanying Fig. 1 and in the

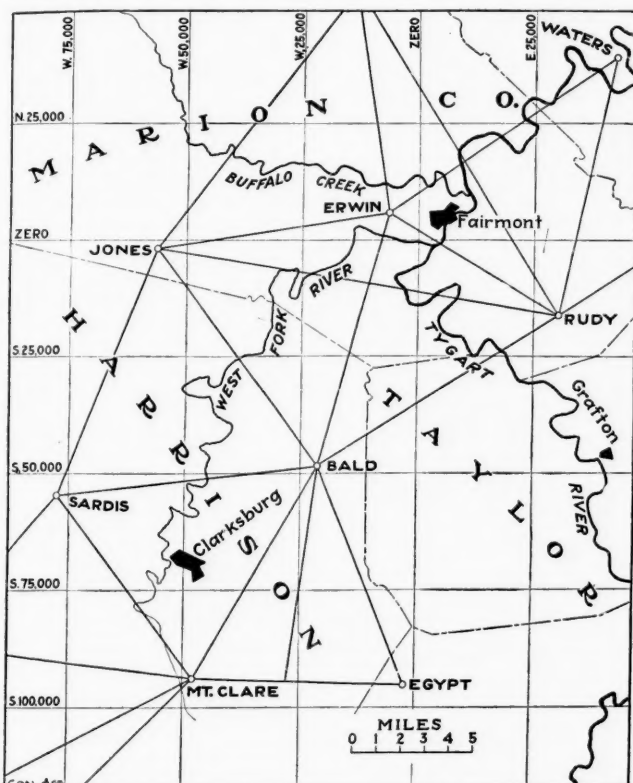


FIG. 2. PRIMARY TRIANGULATION SURVEY; FAIRMONT-CLARKSBURG REGION

notes. In the triangle $M_1O_1N_1$, the readings on angle O_1 are here given:

Aug. 26, 1901		Party { Molt, Jones, Charles, Johnson, German.	
9 a.m.		Cool & Hazy	
$\angle M_1O_1N_1$			
A	1° 04' 15"	Telescope Direct	
1	30° 05' 30"	29° 01' 15"	Average 29° 01' 18.75"
2	59° 06' 50"	29° 01' 20"	
3	88° 08' 15"	29° 01' 25"	
4	117° 09' 30"	29° 01' 15"	
A	90° 14' 15"	Telescope Reversed	
1	119° 15' 30"	29° 01' 15"	Average 29° 01' 18.75"
2	148° 17' 00"	29° 01' 30"	
3	177° 18' 10"	29° 01' 10"	
4	206° 19' 30"	29° 01' 20"	
$\angle N_1O_1M_1$			
A	360° 22' 15"	Telescope Direct	
1	331° 21' 00"	29° 01' 15"	Average 29° 01' 20"
2	302° 19' 45"	29° 01' 15"	
3	273° 18' 25"	29° 01' 20"	
4	244° 16' 55"	29° 01' 30"	
A	270° 30' 30"	Telescope Reversed	
1	241° 29' 30"	29° 01' 10"	Average 29° 01' 15"
2	212° 28' 00"	29° 01' 20"	
3	183° 16' 45"	29° 01' 15"	
4	334° 15' 30"	29° 01' 15"	
Mean 29° 01' 18.13". Weight 2			

In these readings each series was read on the *A* vernier, while in most cases later the *B* vernier was read when the telescope was reversed, thus eliminating errors due to angular distance between the verniers and to any eccentricity of the graduated limb.

The instrument used had vernier graduations to read 20 sec. direct, making it possible to estimate to 5 sec. When readings were started the vernier was set by naked eye to the starting point, then read with a magnifying glass and recorded. These readings are shown opposite *A*, as found in each particular case. In the first two series, the backsight was taken on M_1 and the angle turned to N_1 , where the vernier was clamped. After the reading was taken the spindle was unclamped and the backsight again taken on M_1 without resetting to the original starting point, but each angle being added to the one previously read, thus making cumulative readings. Subtracting *A* from each of the following readings and divid-

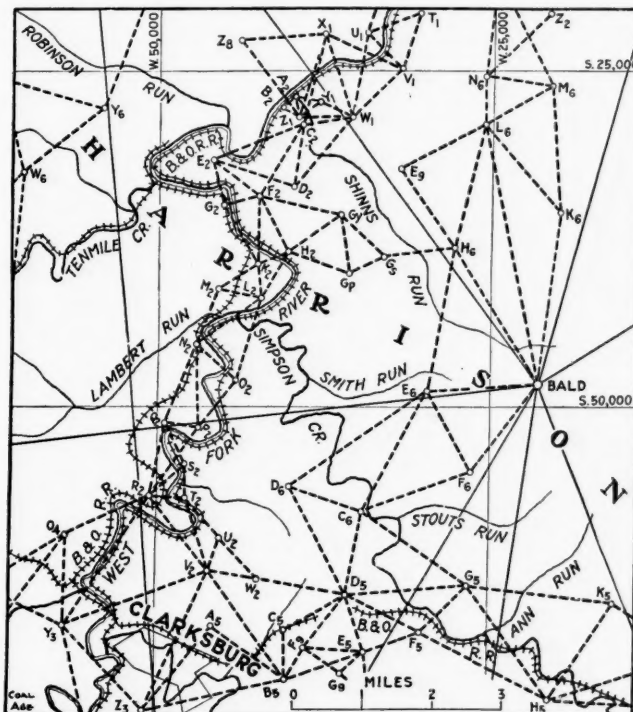


FIG. 3. SHOWING TRIANGULATION SURVEY IN VICINITY OF CLARKSBURG, W. VA.

ing by the number opposite to the left, gives the reading recorded on the right. In the first two series *A* is subtracted from the readings which follow, while in the last two each reading is subtracted from *A* and divided by the number opposite.

The "mean" result is the average of the four average results to the right. The weight 2 designates the condition under which the readings were taken. Weights were used from 1 to 5, inclusive. Number 1 represented excellent conditions, while number 5 represented the worst. These weights were used in distributing the error of closure when the triangle was adjusted. This may be shown by the triangle in which the angle O_1 formed a part:

	$M_1 - N_1 - O_1$	Corrected
$M_1 N_1 O_1$	128° 39' 39.06" + 1.74" = 128° 39' 40.80"	
$N_1 O_1 M_1$	29° 01' 18.13" + 1.16" = 29° 01' 19.29"	
$O_1 M_1 N_1$	22° 18' 58.75" + 1.16" = 22° 18' 59.91"	
	179° 59' 55.94" + 4.06" = 180° 00' 00.00"	

Here, the error of closure was -4.06 sec., and the weight on the angles N_1 , O_1 and M_1 were 3, 2 and 2, respectively. Therefore, N_1 took three-sevenths of the error, while O_1 and M_1 each took two-sevenths of the error to make the sum of the angles equal 180 deg. In only the most extenuating cases were errors of closure

allowed to stand, which exceeded 5 sec., this being the set limit.

After the adjustment of the angles came the calculation of the distances or sides of the triangles. The well known trigonometric formula: "The sides of a triangle are proportionate to the sines of the angles opposite," was used. Thus in the given triangle $M_1N_1O_1$, say the side M_1N_1 had been previously calculated, then:

$$\frac{\sin \angle O_1}{\sin \angle N_1} = \frac{M_1N_1}{M_1O_1}$$

which, by transposition, becomes

$$M_1O_1 = \frac{M_1N_1}{\sin \angle O_1} \times \sin \angle M_1$$

Also

$$N_1O_1 = \frac{M_1N_1}{\sin \angle O_1} \times \sin \angle M_1$$

Then one division serves for both equations. These calculations were performed by naturals, the sines of the angles being carried to ten decimal places in order to determine the ninth. In the division of M_1N_1 by the sine of $\angle O_1$, the result was carried to five places to determine the fourth, and likewise, the results of the multiplications were adopted to four decimal places.

COMPUTING THE DISTANCES

In the calculations of the sides of these triangles, the base line at Beechwood formed the side of the first triangle at that end and the base line at Ehlen formed the side of the first triangle at that end. Then somewhere between there was one side which had to be calculated from adjoining triangles. When the work from each way met, the difference between the calculated lengths amounted to 24 ten-thousandths of a foot (0.0024 ft.). Thus the surveys were checked all through the system.

The next step consisted in obtaining courses between the various stations. As previously stated, the true meridian had been established near Watson and transferred to a side of one of the triangles from which all the other sides were calculated by means of angles between the sides. One method was by addition and the other by subtraction, and the results checked one against the other. Thus, say the azimuth of the side M_1N_1 of the triangle $M_1N_1O_1$ is:

Addition		Subtraction	
Add	$M_1N_1 = 129^\circ 13' 50.05''$	Reverse	$129^\circ 13' 50.05'' = M_1N_1$
	$M_1 = 22^\circ 18' 59.91''$	Get	$309^\circ 13' 50.05'' = N_1M_1$
		Subtract	$128^\circ 39' 40.80'' = N_1$
Reverse	$M_1O_1 = 151^\circ 32' 49.96''$	Reverse	$180^\circ 34' 09.25'' = N_1O_1$
And get	$O_1M_1 = 331^\circ 32' 49.96''$	Get	$360^\circ 34' 09.25'' = O_1N_1$
Add	$O_1 = 29^\circ 01' 19.29''$	Subtract	$29^\circ 01' 19.29'' = O_1$
Reverse	$O_1N_1 = 360^\circ 34' 09.25''$	Reverse	$331^\circ 32' 49.96'' = O_1M_1$
Get	$N_1O_1 = 180^\circ 34' 09.25''$	Get	$151^\circ 32' 49.96'' = M_1O_1$
Add	$N_1 = 128^\circ 39' 40.80''$	Subtract	$22^\circ 18' 59.91'' = M_1$
Reverse	$N_1M_1 = 309^\circ 13' 50.05''$		
Get	$M_1N_1 = 129^\circ 13' 50.05''$		$129^\circ 13' 50.05'' = M_1N_1$

After the azimuths and distances of the side of each triangle were calculated, the quadrants or courses were easily obtained from the azimuths and the latitude and longitude differences were computed by naturals. In these calculations also, were the sines and cosines carried out to nine decimal places. Having obtained these differences, the zero point of the coördinate system was placed at Mine No. 56, near Watson, and total latitudes and departures were worked up for all the stations from this point.

The values on each station were checked by working in both directions around the triangle. For instance, in

the triangles ABC and BCD , previously given, the point A being taken as zero, say B is north 2000 ft. and east 1000 ft. from A , therefore C must be south 1950 ft., and east 1000 ft. from B by calculation from the course and distance between them, if C is north 50 and east 2000 from A . Likewise, d must receive values from b and c that coincide, and all the way through the system, the values on the stations received from the different points must check. At some places, quadrilaterals were used and the same line would be calculated from different sources.

LATITUDES AND DEPARTURES

After all the coördinate values were placed in the record book, together with the other data of the survey, such as azimuths, quadrants, etc., shown on a regular traverse sheet (see *COAL AGE*, Feb. 21, 1914), the elevations on the stations were calculated from the vertical angles taken between stations and the previously calculated distances. The sights on the rod were taken on the top and the correction made for the 8-ft. difference. Set-ups were made on each station, thus checking one reading and calculation against the other.

Say from A to B the reading was plus $2^\circ 50'$, rod 8 ft., and the reading from B to A was minus $2^\circ 19'$, rod 8 ft., and the distance between the points 1000 ft. The height of instrument at A was 4 ft. and at B it was 3.50 ft. Then from A to B we get plus 49.05 — 8 ft. (rod) plus 4 ft. (instrument) equal to plus 45.05 ft. From B to A , we get minus 43 ft. minus 8 ft. plus 3.50 ft. equal to minus 44.93 ft. In places where it was difficult to get these verticals to correspond, precise levels were run to the stations and checked back on the bench mark. The elevations on the triangulation stations served as checks on the elevations carried by transit and tape surveys. The calculation of vertical distances was performed by means of naturals and logarithms carried to seven decimal places.

This triangulation survey now forms the framework of all other surveys in the field. The results and benefits derived from this work have already proven invaluable in many ways.



The Consumption of Water in Anthracite Mines

The desert of Sahara, where they occasionally kill and cut open a camel in order to get the water which it contains, is not the only place where water is a valuable salable commodity. Right at our doors, in the anthracite mines of Pennsylvania, the operators pay out nearly \$600,000 a year for pure, fresh water. This is necessary, after pumping over 1,000,000,000 tons, or approximately 300,000,000,000 gal. of water a year out of the mines.

Mine water is plentifully charged with sulphur, and the disastrous effect of the sulphur upon iron necessitates the frequent renewal of the hundreds of miles of pipe in the mines. A pipe line laid new early in April has been known to be ruined by July.

One company bought 1,316,369,963 gal. of water last year for which it paid \$109,494.76, and consumed nearly 100,000,000 gal. at one colliery. The total quantity of fresh water bought by the anthracite coal operators last year is calculated to be 7,115,573,324 gal. and the cost \$591,863.56.

Wire Ropeways for Coal Transport

SYNOPSIS—The wire ropeway often is found more adaptable to mining operations than the railway. It is not usually subject to the formation and configuration of the land; and it is both simple of construction and inexpensive of operation.

It is not always possible to arrange matters so that the railway siding is immediately adjacent to the most convenient loading point of a colliery, and in some cases the

railway, is that the former is dependent neither upon the configuration or formation of the ground over which it has to pass. It can cross roads and other obstructions at the required height without being a hindrance to the traffic below, as cables can be suspended from points 1000 yd. or more apart, deep valleys and rivers can be negotiated. A wire ropeway is also suitable for a steep mountain side. Moreover, a railway often has to be laid in curves, owing to the natural formation of the ground

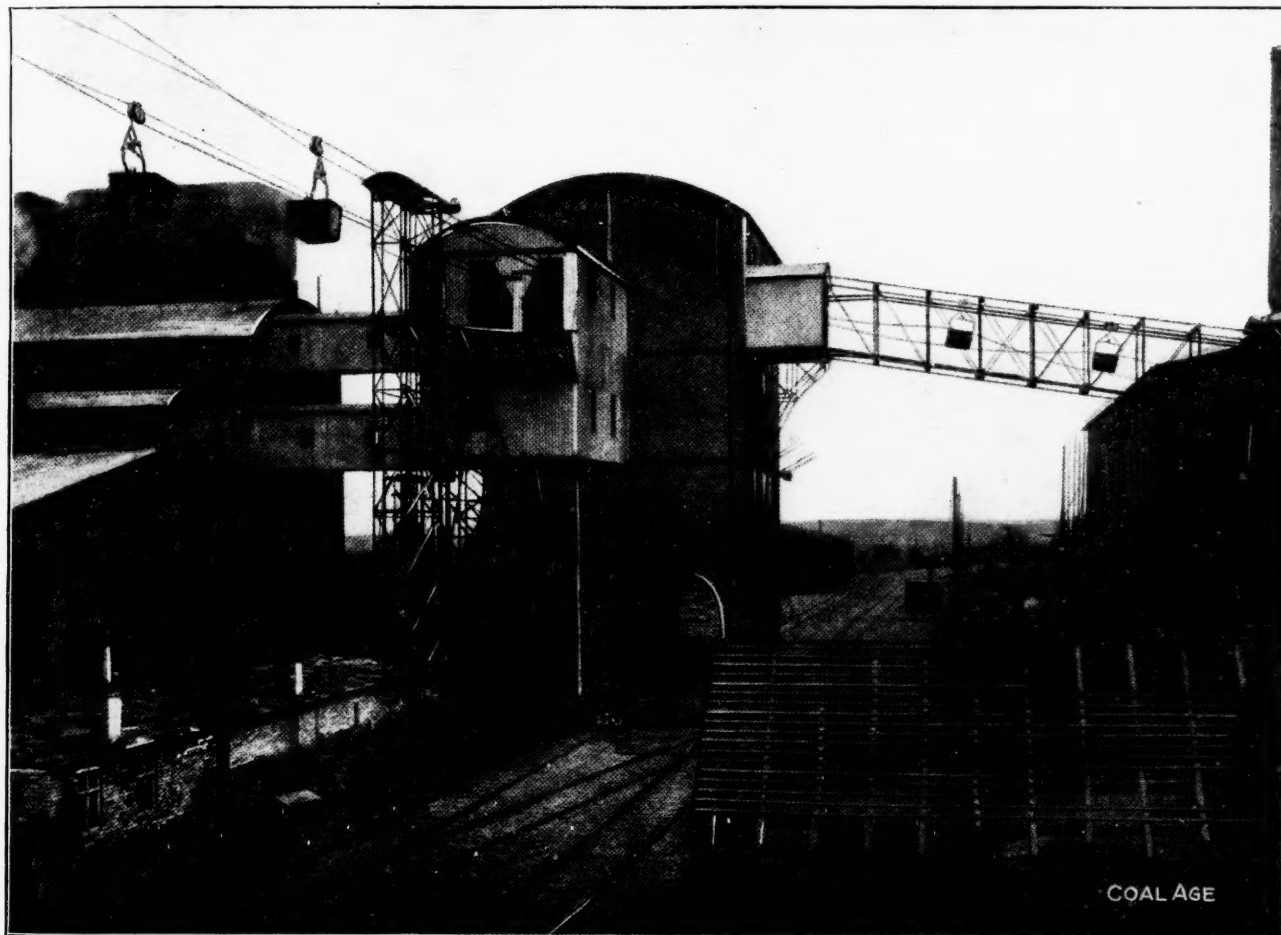


FIG. 1. WIRE ROPEWAYS. NOTE THE PROTECTION BRIDGE ERECTED OVER THE ROAD CROSSING TO INSURE PUBLIC SAFETY

question of transport between a colliery and the main line railroad, or shipping point, becomes a matter of serious difficulty. It is of interest therefore to examine the alternative method of transmission by wire ropeways, which has been developed to a very considerable extent in Germany and elsewhere, and we are indebted to Messrs. A. W. Mackensen, of Schoeningen, for details of some of the plants of this type which they have constructed.

ADVANTAGES

It is claimed that with modern methods of construction the results obtained with suitably erected wire ropeways are so favorable that, nowadays, if two points are to be connected, the wire ropeway may be as readily taken into consideration as an ordinary railway. The most important advantage of a wire ropeway, as compared with a

or to the necessity of avoiding private property, public roads, etc., while the difficulty of making a straight wire ropeway for any of these reasons is much less. Consequently, the wire ropeway is often shorter than the equivalent railway, leading not only to a lower cost but less operating expense. The latter point is also secured by the fact that the wire ropeway works entirely automatically except at the end stations, and even there the loading and unloading of the cars can be accomplished with a very small amount of labor because of the easy handling of the cars and the small loads carried in each unit. The wire ropeway is not influenced by weather as its working cannot be interrupted by snow, frost, floods, etc., and the construction or moving of such a line does not involve much time or expense. In case of difference of level, a saving of power can often be effected by balancing the

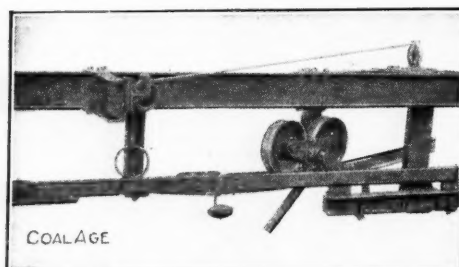


FIG. 2. THE MACKENSEN SYSTEM OF SIMPLIFIED SPECIAL SWITCH

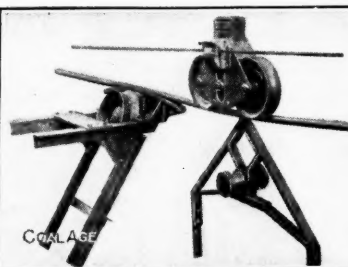


FIG. 3. A SPECIAL SAFETY CROSSING SYSTEM

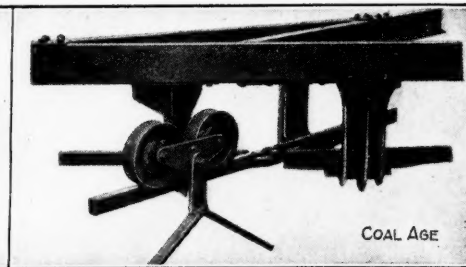


FIG. 4. A ROPEWAY CAR PASSING A SUPPORT

weight of the cars moving in one direction against that of those moving in the opposite direction on the return journey. As the wire ropeway can make such a good showing as compared with railways, it is evident that it is even more advantageously employed as compared with horse haulage.

DISADVANTAGES

A wire ropeway cannot, however, be compared with machines which are manufactured on a large scale and are then put on the spot where they have to work, because every ropeway must be planned differently in each individual case in order to suit the special conditions. The single parts cannot, as a rule, be calculated theoretically but can only properly be estimated on the basis of experience. The cars and other accessories must be able

meeting beam. An automatic coupling device is constructed on the principle that the clamps which hold the traction rope on both sides are pressed together by the weight of the car in such a manner that the frictional power is several times the weight carried. As a means of transmission, a wedge is used, which moves the clamps exactly parallel to themselves so that, as the rope is never pressed obliquely at any time, it attains its longest possible life. The pressing power can be exactly calculated and is maintained from the moment when the rope is gripped by the clamps until it is released. The proper working is not upset by wear on the rope or clamps, and a car can change from one line to another even if the traction ropes have differing diameters. It is not necessary to detach the car from the traction rope in taking curves as the cars will take these automatically.

The tilting of the cars at the station is usually accomplished by hand, but it is also easy to provide automatic unloading. This is specially useful for the purpose of building up heaps of material such as clinkers, coal, etc.

ILLUSTRATIONS

Fig. 5 shows a portion of a wire ropeway about five miles long, for transporting coal and clay. The capacity per hour is 140 cars of coal, containing 21 cu.ft., and 60 cars of clay of 14 cu.ft. Fig. 1 shows another wire ropeway for transporting coal and taking back mining timber, the feature of the photograph being a protection bridge erected over a road crossing and showing the simplicity with which safety to the public is secured. Figs. 2, 3 and 4 show, respectively, the Mackensen system of simplified special switch, a special safety crossing system, and a ropeway car passing a support. A good many other examples could be given of the application of the wire-rope-way system for coal transport, but, these are sufficient to show the importance of its various applications.



FIG. 5. A PORTION OF A WIRE ROPEWAY ABOUT FIVE MILES LONG

to stand rough handling, and not only must the wire ropeway be free from danger of breaking at any point but it should also be kept permanently in good condition.

CONSTRUCTION FEATURES

The carrying ropes are generally of a closed construction and if only light loads are to be carried, or if the cost of construction is to be as low as possible, round wires are used. For traction ropes, cables of a special construction are adopted which go round large pulleys at the end stations and are always kept in tension by means of weights. If very heavy loads are to be conveyed, the weight is duplicated so as to be carried by four or more wheels, that is to say, by suspending a load from two single carriages, or by means of a special double trolley in which two single trolleys are combined by a con-

Immigration and Emigration

The Department of Labor reports the arrival and departure of aliens in the United States for the year ended June 30, 1913, and for the six months ended Jan. 1, 1914, as follows:

	Year			Six Months		
	Arrivals	Departures	Net*	Arrivals	Departures	Net*
July.....	78,101	24,673	+ 53,428	138,244	26,434	+111,810
August.....	82,377	25,725	+ 56,652	126,180	23,242	+102,938
Sept.....	105,611	23,728	+ 81,883	136,247	19,241	+117,006
October.....	108,300	27,153	+ 81,147	134,140	26,998	+107,142
Nov.....	94,739	41,444	+ 53,295	104,671	27,632	+ 77,039
Dec.....	76,315	45,048	+ 31,267	95,387	30,243	+ 65,144
Jan.....	46,441	29,730	+ 16,711	44,708	34,216	+ 10,492
Feb.....	59,156	15,253	+ 43,903	.....	.....	.....
March.....	96,958	15,044	+ 81,914	.....	.....	.....
April.....	136,371	18,331	+118,040	.....	.....	.....
May.....	137,262	19,131	+118,131	.....	.....	.....
June.....	176,261	22,930	+153,331	.....	.....	.....
Total.....	1,197,892	308,190	+889,702	779,577	188,006	+591,571

* Indicates the net change in population from alien immigration and emigration movement.

High Records in Illinois

The mines of the Superior Coal Co., located at Gillespie and Benld, produced on Monday, Mar. 9, 1914, 13,431 tons of coal, as follows:

	Tons
Mine No. 1.....	4393
Mine No. 2.....	4430
Mine No. 3.....	4608

There was no special preparation for this record hoist, as the same mines hoisted 12,288 tons on the Saturday preceding, and made an average hoist for that week of 12,277 tons per day. Mine No. 3 hoisted in four hours, Monday afternoon, 2525 tons; which would, at the same rate, produce over 5000 tons in an eight-hour shift. The best single-day's hoist, made at No. 3, is 4748 tons.

The mines of the Superior Coal Co. ranked, in the Coal Report of Illinois, for the year ended June 30, 1913, as follows: No. 3 was second in the state, producing 837,834 tons, employing 675 men, working 216 days and making an average daily hoist of 3879 tons.

No. 2 was third, producing 828,288 tons, employing 665 men, working 215 days and made an average daily hoist of 3853 tons.

No. 1 was sixth, producing 681,852 tons, employing 659 men, working 212 days, and making an average daily hoist of 3216 tons.

In the Coal Report of Illinois, for the year ended June 30, 1913, there were 33 mines that had an annual pro-

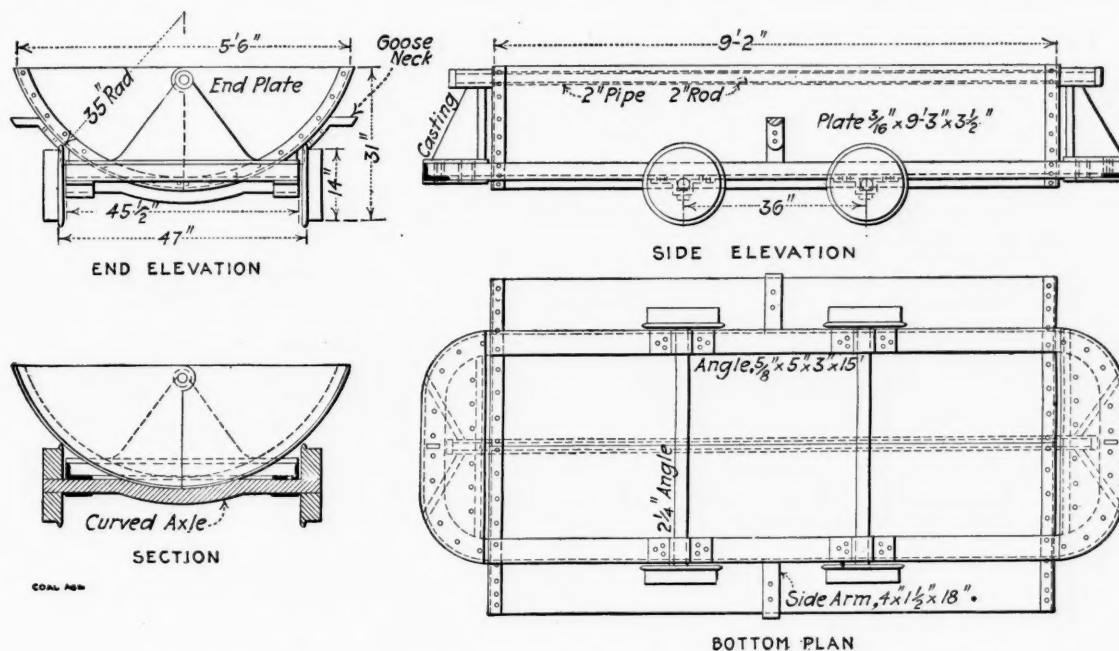
	1903	1913
Shipping mines in operation.....	353	371
Total number of employees.....	49,814	79,497
Total tonnage.....	34,955,400	61,846,204
Mined by machines (tons).....	7,646,777	30,228,520
Fatal accidents.....	156	175
Nonfatal accidents (30 days lost time).....	410	1025
Death rate per 1000 men.....	3.13	2.20
Death rate per million tons of coal....	4.46	2.83

Since the foregoing was written, we have been informed that the No. 2 and No. 3 mines of the Superior Coal Co., have each made a record hoist of more than 5000 tons of coal in an eight-hour day. Saturday, Mar. 14, No. 2 mine hoisted 5023 tons; and Thursday No. 3 tried for the 5000-ton mark and failed. They were able to hoist 4854 tons, but on Friday, Mar. 20, No. 3 jumped into the 5000-ton class and hoisted 5116 tons, which is at the rate of 639.5 tons per hour, or more than 10 tons a minute. In making the record at the No. 2 mine, 1562 mine cars were brought to the surface and it required 108 railroad cars to haul the coal away from the mine.

The mines last named, Nos. 2 and 3, are each shaft mines to the No. 6 seam and are 340 ft. deep; the coal is 7 ft. 6 in. in thickness and is mined by machines.

The Clam-Shell Mine Car

A new mine car has been designed by N. H. Mannakee, a mining engineer of Williamson, Mingo County, W. Va. It reduces the labor of dumping at tipples, head houses and bins. The cars need not even be uncoupled when dumped, and if discharged onto a moving apron, they would empty their load without any breakage. In any



THE MANNAKEE MINE CAR WHICH OPENS LIKE A STEAM-SHOVEL BUCKET

duction of more than 400,000 tons and 61 mines that produced more than 300,000 tons. The Coal Report of Illinois, for the year ended June 30, 1903, showed that four mines had a production of more than 400,000 tons and 15 a production of more than 300,000 tons.

This is a splendid increase in the number of large producing mines and the tendency is to a still greater producing capacity. In this connection, the following comparison shows an interesting growth:

event, their manner of dumping is such that they are far less destructive to coal than the old end-gate car.

For work in a low seam, the car will carry a larger capacity than the ordinary steel or wood cars of the same height above the rail and the same outside dimensions in plan. This results from the fact that by the curvature of the axles, the car body is kept closer to the rail. These axles support the car and keep it true to radius.

The goosenecks or side arms which lift the jaws of

the bucket are raised slowly by the pushing or pulling of the car past curved guide bars on the side of the track. These bars are so shaped or bent that when the car is opened full they keep it in this condition for a distance about equal to the length of the car. The guides then curve downward to allow the shells to come together gently as the car passes onward.

Theoretically, the gooseneck should be lifted an amount equal to about one-half the size of the largest lump of coal to be discharged. In practice, probably a lift of 15 in. would be enough. This would provide an opening in the bottom of 30 in., and in the inventor's experience, he has found this opening sufficient.

It can be readily seen that a car with much greater capacity could be obtained by raising the sides. The bill of material, weights, etc., for a car for use in a low seam, follow:

BILL OF MATERIAL OF MANNAKEE CAR				
Pieces	Size	Weight	Description	
2	2 1/2" sq. x 57"	166	Axles	
4	14" diam.	372	Wheels	
4	1 1/2" x 16" x 5 1/2"	18	Boxes	
2	3" x 5" x 1 1/2"	473	Frame angles	
2	Castings	400	End supports	
2	1 1/2" x 48" x 13"	125	Bottom bumper plate	
4	1 1/2" x 42" x 2 1/2" x 2 1/2"	82.6	Angles at ends	
2	4" x 1 1/2" x 18"	120	Side arms	
1	2" x 126"	112	Round shaft	
1	2" x 120"	30	Pipe	
4	3/8" x 4 sq. x 7.65	1.5	Sheet steel ends	
2	3 1/2" x 9.25 x 7.65	50.0	Sheet steel side	
72	1"	20	Rivets	
65		140	Bolts	
Total		2683.6		
Capacity of the car level full = 133,159 cu.in. = 49.54 bushels allowing 2.688 cu.in. per bushel. Weight of coal estimated at 2.05 + net tons.				

West Virginia Miners Outdig Canal Laborers

In the last three years the excavation incident to the mining of coal in West Virginia has been greater than the excavation required in eleven years to dig the Panama Canal.

When the engineers of the Panama Canal, in 1903, began their work, they made a careful survey and found that approximately 195,323,000 cu.yd. of excavation was necessary. This was regarded as a stupendous undertaking and was commonly spoken of as the largest excavation job the world has ever seen. Laborers were imported to the Canal Zone, and column after column was written showing how marvelously these laborers were "making the dirt fly" under the direction of the most expert engineers the world has ever seen.

But the 195,323,000 cu.yd., the original estimate, were not all that the Panama Canal laborers were to dig after they had started. On account of the slides in Culebra cut, another hundred million cubic yards were to be added to their work. This made 295,323,000 cu.yd., which were dug in eleven years.

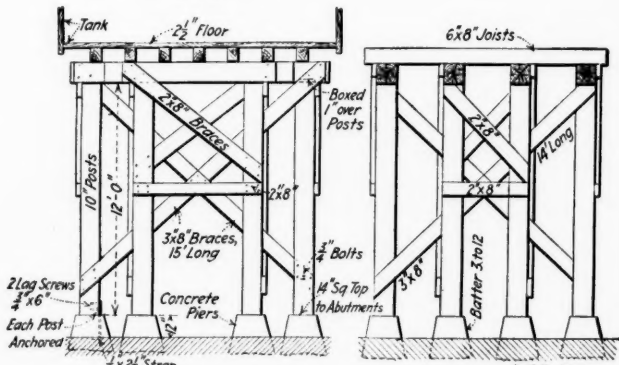
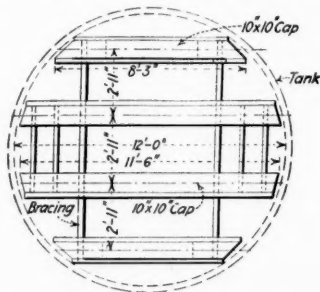
Under conditions far more difficult, the coal miners of West Virginia were to do an amount of excavating in the same eleven years that would make the digging incident to the Panama Canal look like child's play. The work of these West Virginia miners has never been heralded to the world as the last word in excavation efficiency. As a matter of fact, the general public has paid little attention to it. But in the eleven years, while the much heralded work at the Panama Canal was producing 295,323,000 cu.yd. of earth—and all of the excavating was being done on the surface—the coal miners of West Virginia were getting out of the bowels of the earth 542,949,446 cu.yd.

of coal. This was almost twice the amount of excavation of the Panama Canal, and it was done under far more difficult conditions.

Substructure of Wooden Water Tank

By WILLIAM WALLACE*

A necessary adjunct to every iron-range boiler plant is the water tank. The flat topography usually eliminates the possibility of setting the tank on high ground to gain head, and for that reason it is usually put near the boiler house. The latest tanks are of the elliptical-bottom steel



POSTS, STRINGERS AND BRACING TO CARRY WOODEN TANK

type, raised to considerable height on a steel structure, but wooden tanks supported on a wooden substructure in the manner of railway tanks are still common. Such a substructure of standard type is illustrated herewith. It is built of sawed timber set on concrete piers and usually painted. The tank supported in this case is 12x12 ft.—*Engineering and Mining Journal*.

BY THE WAY

Those things we never had we can never lose.

It is easier to follow foolish precedents than to think.

Things sweetest to the taste often prove sourest in the stomach.

Exhaustive observation is an element of every great achievement.

Adjourning sine die seems to be the most popular indoor sport in the coal industry today.

Exclusive praise must not be given to the horse that wins the race—some belongs to the man that keeps the stable.

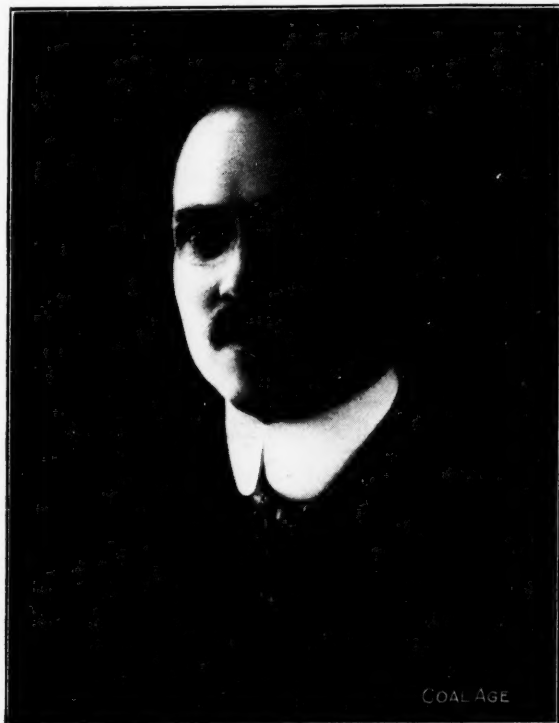
*Mining engineer, New York.

Who's Who in Coal Mining

Frederick William Whiteside was born at Chicago, Ill., Nov. 2, 1875. On his mother's side, Mr. Whiteside was a direct descendant of Captain Amasa Hungerford, of the Revolutionary Vermont troops, the Hungerford family having landed upon American soil in 1632.

Mr. Whiteside's education was obtained in the public schools of Denver, Colo., and at the University of Colorado, from which latter institution he graduated.

His first work on leaving the university was as assistant engineer with the Denver Union Water Co., and later in the same capacity with the Denver & Rio Grande R.R. Co. He then became division engineer of the El Paso & Rock Island R.R. Co., which position he left to take up his first work in coal mining as assistant engineer, with the Colorado Fuel & Iron Company.



F. W. WHITESIDE

But railroad work once again attracted Mr. Whiteside and he became chief engineer for the New Mexico Midland R.R. Co. However, he soon returned to the coal industry, becoming chief engineer of the Southern Fuel Co.

Mr. Whiteside is now chief engineer of the Victor-American Fuel Co. as well as other enterprises, such as marble, telegraph and railroad companies, besides being retained in a consulting capacity by the Keystone Fuel Co. He is Secretary-Treasurer of the Rocky Mountain Coal Mining Institute, and a member of both the Colorado Electric Club and the University of Colorado Club, of Denver. Mr. Whiteside has been a frequent contributor to the technical press of the country, and occasionally lectures at the educational institutions in Colorado.

Harry Mortimer Kanarr was born Aug. 31, 1876, near Deckers Point, Indiana County, Penn. Mr. Kanarr's early education was obtained in the public schools, which was followed up by a special mathematical course in the State Normal School at Indiana, Penn., and supplemented by home studies.

His first practical training was obtained under his father, and consisted mostly of land and property surveying. In October, 1902, however, we find him out on his own initiative, being employed as a transitman under Walter F. Arms, chief engineer of the Rochester & Pittsburgh Coal & Iron Co. His first work for this concern was in charge of the construction at the Ernest Mines, near Indiana.

Exactly one year later he was transferred to Iselin as



H. M. KANARR

assistant to Robt. H. Wilson, chief engineer in charge of the construction of that plant. January, 1905, found him again transferred to Punxsutawney, where he became division engineer under Geo. D. Bartholomew, a few months later becoming Mr. Bartholomew's assistant. In May, 1907, he was appointed chief engineer in responsible charge of all the work formerly handled by all three of his previous employers.

Mr. Kanarr is now chief engineer of the Rochester & Pittsburgh Coal & Iron Co., the Jefferson & Clearfield Coal & Iron Co., the Cowanshannock Coal & Coke Co., the Reynoldsville & Falls Creek R.R. Co., and at the present time, he is also serving as secretary-treasurer of the Hudson Coal Mining Co.

The Labor Situation in Ohio

Walter R. Woodford, president of the Eastern Ohio Operators' Association, is preparing a suit to be filed as soon as possible to test the validity of the Ohio screen-coal bill. There is a question as to whether this case can be brought before the law becomes effective on May 20. In the meantime, the operators of Ohio are waiting for developments.

George Savage, secretary of the United Mine Workers of Ohio, has announced that steps will be taken immediately toward bringing about a joint conference with Ohio operators.

Every mine in Ohio closed Tuesday night of last week; Wednesday, eight-hour day meetings were held in all of the principal coal mining centers. President John Moore, of the United Mine Workers of Ohio, addressed a mass meeting in Bridgeport. He prefaced his remarks by calling upon the miners to remain loyal to the organization and admonished them against socialists and the Industrial Workers of the World. The latter organization at the present time is attempting to rouse miners of the No. 8 district.

A SPLIT IN THE UNION RANKS

At Roseville, the local union passed resolutions calling upon John P. White, president; Frank J. Hayes,

vice-president; and W. O. Green, secretary-treasurer of the United Mine Workers of America, together with the members of the policy committee of the union, to resign. The Roseville union charged that the negotiations and policy of the officials were not satisfactory nor to the best interest of the men. The resolution was forwarded to all of the unions in Ohio with a request that similar action be taken.

This movement and the defection of miners are so serious that Mr. Green will address the Crooksville, Ohio, union Tuesday. He will ask for explanations. A circular mailed out from the headquarters in Indianapolis, Saturday, exhorts the miners to remain loyal and advises them to support the officers in the referendum being taken on the policy adopted by the committee.

The failure to win the mine-run wage scale throughout the state has caused the miners to attempt to make local settlements. None of the companies has shown any intention of weakening. The miners have not succeeded in getting conferences in the sub-districts and it looks as if nothing will be done except as a state organization.

Miners are not all of one opinion, but the majority of them are convinced that the mines will generally remain closed until the mine-run law has been tested in the courts. They do not expect to have work until late in the summer in most instances.



THE REAL BASE BALL TEAM

Editorials

The Present Industrial Idleness

To judge by the dailies of our various cities, the country is now menaced with an army of unemployed, larger and more desperate than we have known for years.

Our newly appointed Federal Industrial Commission has been seriously enough impressed by the facts as reported, to feel justified in ordering an immediate investigation, looking toward action by the Federal Government, to relieve unemployment. Frank P. Walsh, chairman of the commission, is quoted as saying: "Groups numbering from 100 to 1000 stand outside our great industrial plants each morning at six o'clock, hoping the foremen will pull them out of line and put them to work. They are thankful if they get only a few hours' work.

"Poorly nourished and thinly clad, these men gather each morning and then drift away to the cheap saloons or cheap lodging houses to wait for any other chance.

"None can see this spectacle without realizing that it is something society cannot afford to tolerate. An employer never thinks of laying off his bookkeeper or clerk after employing him three or four hours in a day or three or four days in a week.

"The problem of continuous employment for laborers is more difficult, but it is a problem that must be solved if we are to check the increase in our great army of hopeless, homeless men. If nothing else will avail, it may be necessary to urge insurance against nonemployment."

Now would be a good time for some of you mine owners to invite the reporters from some of these same dailies to inspect your diggings; especially the fellows who always refer to you in graphic sneers. In spite of the fact that the coal trade has been extremely dull this winter, our coal-mining camps are not infested by hungry bands seeking employment and such spectacles as Mr. Walsh describes are almost unbelievable to coal miners in America.

A Smell Is a Smell

Kipling has stirred up a very lively discussion in England by publishing the following lines: "I suggest, subject to correction, that there are only two elemental smells of universal appeal—the smell of burning fuel and the smell of melting grease. In other words, the smell of what man cooks his food over and what he cooks his food in."

If Kipling ever visited a mine, his smeller must have been off duty, or else he forgot the experience before he wrote the above lines. And even at that, we insist that his wits must have been wool-gathering when he sat down to write. Before man can start a fire to cook food, he must have the fuel and the food, and while he is digging these up, the real elemental smell comes into being. You can trace it back to Genesis; "In the sweat of thy face shalt thou eat bread, till thou return unto the ground."

At a coal mine, equipped with a modern bath and

change house, this elemental smell may not penetrate the camp, but it is generally within striking distance, nevertheless. At the less favored camps, it is more than liable to come out to meet you, as you enter a house, and around some of the rooming houses, there is danger of its standing guard and driving away the uninitiated and faint-hearted.

We are not casting any aspersion toward our coal miners; they probably bathe oftener than any other class of workingmen; but a smell is smell for all that.

Chickens as Gas Detectors

Experiments seem to prove that chickens are not suitable for use as detectors of gaseous atmospheres in mine-rescue work. In combating a mine fire at a colliery in the Raniganj coal field in India, a chicken was carried in by two members of the fire-fighting squad. On returning to the pit bottom the chicken was all right, but both men fell to the ground in a collapsed state.

Another instance of the use of chickens was at the rescue operations at the Kendwagih colliery, where it was noticed that the chickens were quite unaffected by the mine atmosphere while the men were knocked over.

One reason for the experiments with chickens is due to the fact that many mining men believe that mice and canaries are too delicate indicators of danger. Such authorities contend that the margin of safety with mice and canaries is too large, for these latter, when used as detectors, keel over at a time when men are still unaffected and can continue quite a while in their rescue operations.

What is desired is some animal or bird that is only slightly more susceptible to poisonous atmospheres than man. At the same time, of course, it must be remembered that in rescue work, the man is actively engaged in expending physical effort, while the animal is usually at rest.

Don't Destroy Your Records

The press dispatches from Houghton, Mich., of Mar. 4, reported that the books of the mining companies were brought into court to disprove miners' statements as to starvation earnings they received during the years 1908 and 1911.

The companies were thus able to exhibit to the court the original entries, down to the last penny, showing the actual earnings of all of the men who had testified, and the evidence thus presented, disproved most of the miners' contentions.

Here, then, is another illustration of the importance of preserving old records. Year by year, as the books of any company begin to accumulate, the temptation to destroy old files becomes more and more persistent and occasionally a good-sized bonfire follows. But, unfortunately, something more troublesome than musty files often rises up from the bonfire ashes.

The popular idea, that if a bank president or a corporation auditor testifies that the books of his firm were destroyed, he admits that he is trying to hide someone's guilt, is far from correct, in many instances, as some who read these lines could probably testify. But knowing a thing yourself and being able to convince others of the truth of your information, are quite different matters.

We recall a laughable but highly satisfactory turn to testimony being taken before an arbitration board, during a miners' strike, some years ago. The president of the miners' union had been ranting in quite approved manner about the terrible iniquities of the company stores in the district and the unreasonableness of expecting the men to do all of their trading in these stores, when competing merchants offered so much more for one's money.

This miner's president lived at one of the mining villages where there was one of these commissaries and some six or eight independent stores, so he surely spoke with full knowledge. Imagine the surprise of all present when counsel for the operators produced the books from the terrible company store in the very village where the miners' president lived, and proved that this very president was buying voluntarily from this "robbisary" and buying in such quantities that he must have depended upon it for most of his supplies.

Of course the miners' counsel was able to explain such conduct (to his own satisfaction at least). He stated that the goods handled by the company store were fresher than similar goods handled by competitive stores and his client, the miners' president, was able to stand the premium demanded.

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Schools

This is an age of schools. No one nowadays who looks for success expects to get it without training his employees. We except mining men from this rule. They are imparting a knowledge of mine management, but they are only seeking to develop the men who are striving for first honors.

We were recently reviewing a book on the art of firing a boiler. Like all real mining men, we had not yet realized that there was a true art in heaving and spreading coal and raking the grate bars. But there is. When we begin to try to teach our employees how to perform their duties, we shall learn what a lot there is that we do not know about the fundamentals of our work and it will be hard indeed to tell who are most educated by the school, the teachers or the taught.

We have our miners, our car trimmers, our locomotive engineers, our dumpers, our shotfirers, our stationary engineers and our firemen to teach. Then there must be schools for our store clerks and office men. Have we realized that the sales forces of an insurance company, a cash-registry corporation or a telephone exchange has gone through a course to train them to please the public and help you with your problems?

Why do we take any kind of callow youth to sell groceries and let him stir up dissension by his indifference to customers and drive trade away by his uncleanly appearance? Why are we indifferent to his lack of knowledge as to values and the needs of the trade? Many a company has aroused all the women folk at their mines to open enmity because the store was not run as if their

trade depended on the way in which their pleasures were met.

The time will come when our young miners will come from the village school primed with the facts of first aid and self-preservation and having at least a smattering of the rules of the art of mining. A half century ago, perhaps 25 per cent. of the people could neither read nor write. Ten years from today, everyone will have a certain amount of vocational training. What that time will bring forth in the way of efficiency, we do not dare to guess, but we shall look back then with surprise at the crude attempts at industry which now fill us with admiration.

Everywhere comes the cry, "It can't be done—these men are not bookkeepers, surveyors, track-layers or chemists." Thus systems, simple in character, requiring a week's study perhaps, from those who should carry them out are declared impossible, because the men who must perform them are not sufficiently trained, or lack the necessary desire for efficiency. When men are properly taught, they will themselves originate systems of procedure requiring more skill than we venture now to propose to them.

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The Union and the Republic

Our attitude toward the Miners' Union cannot justly be different from our attitude toward the government under which we live, for in one the laboring man is the only voter, in the other it is his vote which determines the issue. After all, there is little difference between the people represented in the labor unions and in Congress. To despair of the workingmen's councils is to question the safety and the future of the republic.

When we see the conservatism and justice of the masses voting as citizens, how can we doubt their essential fairness and honesty voting as members of a union? Logic and patience will assure industrial peace, just as those qualities will preserve the national existence free from internecine strife.

He who doubts that the union will ultimately realize its responsibility has lost his hold on our past history and the basic facts of our democratic government. By the exercise of industrial statesmanship, we shall at length arrive at a time when the unions will eject from their counsels, as they have largely from their leadership, those mere trouble-makers and mercenaries who threaten alike the operator and the union, and wreck at once the fortunes of the operator and the happiness of the operative.

By giving the labor leader a recognized position and the dignity which goes with it, we assure ourselves that he will respect his responsibilities and will work to advance sanity in labor agitation, honesty in the making of agreements and safety in mine operation.

There are parts of the country where already the union men are learning that to be tribunes of the people does not demand loud-mouthed oratory and class hatred, but qualities of restraint and character such as are demanded of those whose duty it is to direct the destiny of the nation. In such places the leaders go hand in hand with the operator in promoting the common good, and only part when their interests conflict, and then not in anger, but with the object of advancing their legitimate interests. A little reason and an infinity of patience will soon result in bringing union and operator into peaceful agreement.

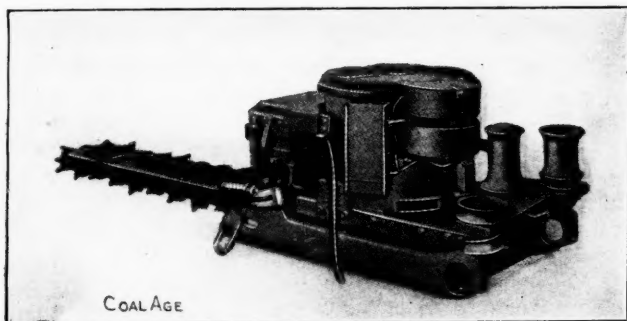
Alternating-Current Coal Cutter

To meet the demand of operators located near transmission lines of large central power plants producing alternating current, a new alternating-current short-wall coal cutter has been placed upon the market by the Morgan-Gardner Electric Company.

The motor is very efficient, having great mechanical strength and ample overload capacity. The small number of parts assure continuous operation with practically no attention. This motor is exceptionally well ventilated. The star-delta control is used, which is the most simple, satisfactory control for induction motors of this capacity.

The stator can be quickly removed from the motor body. The stator core disks are waterproofed and riveted together under hydraulic pressure. The stator coils are form-wound and impregnated with a moisture- and oil-resisting compound that will stand a high degree of temperature. These coils are laid in open slots and easily accessible.

The rotor is fireproof, the bars being imbedded in a special moisture- and heat-resisting cement. The short-



A SHORT-WALL COAL CUTTER ACTUATED BY ALTERNATING CURRENT

circuiting rings are cast solid with the bars, leaving nothing on the rotor to work loose. The rotor shaft is exceptionally heavy with removable heat-treated chrome-nickel-steel pinion.

The three self-aligning ball bearings are of ample proportions to insure cool running and long life, the air gap is always uniform and the motor cannot strike the stator. These dirt-proof bearings are grease lubricated, eliminating all danger of oil trouble.

The construction of the rest of this machine is identical with the well known short-wall type of direct-current machine, embodying such features as single-reduction spur-gear drive to chain-drive sprocket, safety-break washer protecting feed-cable mechanism from overload, means for sumping without use of extra equipment. All parts are inclosed in a heavy rugged frame, yet easily accessible. The cutter arm is of cast steel and the cutting chains are for heavy duty and of single- or double-bit type.

A special feature is the simplicity and safety in handling these machines. A quick-acting positive clutch and the safety-break washer protect the feed cable from overload. The current is controlled by a simple knife switch within easy reach of the operator. By the drag-line control the operator can instantly start or stop the feed of

the machine. All operations, unloading, sumping, cutting, loading and transportation are done by power.

A self-propelling steel truck with friction drive, reverse-drive gearing and removable automatic cable reel are used for transportation.

Saline County Mine Safety Association

The organization of the Saline County Mine Safety Association was perfected on Mar. 19, at a meeting held in the office of the O'Gara Coal Co., in Harrisburg. The following constitution and bylaws is given in full as an example for use by other similar organizations.

NAME—This organization shall be known as the Saline County Mine Safety Association.

OBJECT—The object of this association shall be, through its membership, to learn and to teach the most approved first-aid-to-the-injured and mine-rescue methods; to put this knowledge to practical use through organized teams and classes of instruction whenever occasion offers; to endeavor to increase the membership by getting others to take up the work; to bind closer together those who have taken training by holding frequent local meetings for study and practice, and annual state meetings with like associations for the purpose of comparison and inspiration; and to give to its members an opportunity to study mining, mine safety, first aid, etc., through coöperation with the State Rescue Commission, the Illinois Miners' and Mechanics' Institutes, the State Mining Board, and the United States Bureau of Mines.

CONSTITUTION

ARTICLE I—Section 1. All persons who have taken, or desire to take, the course prescribed for First Aid or Mine Rescue by the State Mine Rescue Commission, or who have been enrolled in the instruction classes of the Illinois Miners' and Mechanics' Institutes, are eligible for membership in this association.

ARTICLE II—Section 1. The officers of this association shall be a president, vice-president, secretary and treasurer, who shall be elected by a majority vote of the members present at the annual business meeting of the association.

Section 2. The government of this association shall be by a board of directors, who shall be elected in the same manner and at the same time as the officers. This board shall consist of sixteen men, of whom the four officers of the association shall be members ex-officio.

ARTICLE III—Section 1. The dues of this association shall be fixed by the by-laws.

ARTICLE IV—Section 1. The president shall preside at all meetings of the association and of the board of directors; shall sign all official documents and bills when satisfied of their correctness; shall appoint a custodian of the association's property; shall appoint a committee to audit the books semi-annually; shall appoint such first-aid and mine-rescue instructors and teachers in mining, as are needed; and shall at all times endeavor to build up the association and increase its usefulness. All appointments by the president shall be made subject to the advice and approval of the board of directors and of the coöperating state department.

Section 2. The vice-president shall, in the necessary absence of the president, assume all the duties and responsibilities of that officer.

Section 3. The secretary shall keep true minutes of all the transactions of the association; shall receive all admission fees, dues and donations; shall give a receipt for all money received, and shall keep a correct account of the same and turn all money over to the treasurer, taking his receipt for the same; and shall sign all bills approved for payment.

Section 4. The treasurer shall receive and care for all money of the association, and pay all bills when they are properly signed by the president and the secretary, taking a receipt for all money paid out; and shall keep a set of books showing all money received and paid out.

BY-LAWS

ARTICLE I—Section 1. The association shall meet at 7:00 o'clock the first Wednesday evening of each month except during June, July, August and September.

Section 2. Special meetings may be called at any time by the president.

Section 3. The officers shall be elected on the regular meeting night in the month of October, and this meeting shall be called the annual business meeting of the association.

ARTICLE II. The dues of the association shall be One Dollar per year, payable in advance.

ARTICLE III—Section 1. The order of business for the annual meeting, and for the meetings of the board of directors, shall be: 1. Roll call. 2. Reading of minutes. 3. Applications for membership. 4. Reports of officers and committees. 5. Communications. 6. Unfinished business. 7. New business. 8. Election of officers. 9. Adjournment. Section 2. Roberts' Rules of Order shall apply at all business meetings.

Following the adoption of the constitution, committees were appointed to perfect the arrangements for the first aid contest to be held at Harrisburg on May 2. The following committees were appointed: Invitation, Wm. Johnson, chairman; Finance, Ed. Joyce, chairman; Grounds, D. B. McGeehee, chairman; Prizes, Wm. Johnson, chairman; Entertainment, O. M. Karraker, chairman; Programme, Oscar Cartledge, chairman.

During the evening the meeting was addressed by Oscar Cartledge, superintendent of the Illinois State Mine Rescue Commission, on the purposes and aims of the first-aid movement, it being the intention of the local association to co-operate with the State Commission in this work. He promised the hearty support of the commission under his management, and is arranging to have periodical examinations of the students in first-aid work, for the purpose of granting certificates to those men who demonstrate their proficiency in the work. R. Y. Williams, director of the Illinois Miners' and Mechanics' Institutes, addressed the meeting on the purposes and aims of these institutes, and introduced the instructor, E. C. Lee, who is in charge of the schools just opened in Harrisburg and Herrin under the direction of the institutes. The latter discussed in detail the scope of the work to be covered by the schools, and the method of instruction, extending an invitation to all present to join the classes.

Referendum of United Mine Workers

In an official circular, President John P. White, Vice-President Frank J. Hayes and Secretary-Treasurer William Green, recount the unsuccessful attempts of the scale committee to secure an agreement with the operators at the Philadelphia meeting, which commenced Feb. 10, and also at the Chicago meeting, which opened session Mar. 17. They say that the policy committee then met to define the course to be pursued and "deemed it unwise to engage in a national strike at this time for the enforcement of" their "demands."

They call for a referendum vote on Apr. 14, authorizing:

The representatives of the United Mine Workers of America in subdistricts, districts and groups of districts to negotiate * * * * wage agreements with coal operators * * * * who will agree to the prices now being paid under the present contract for pick and machine mining, day labor, yardage and dead work or the equivalent of the tonnage and mining prices where any district, subdistrict or groups of districts, either by reason of an act of the legislature or by agreement may change their method of mining from screen coal to mine run.

The proposal to be submitted to referendum permits the local determination of inequalities as to prices and conditions, *requires* the continuance at work of the men pending a settlement of these minor matters where the operators agree to the prices, hours of labor and conditions of employment now in effect, *permits* the working of the men where the scale is being changed from a screen-coal to a mine-run basis while a settlement is being reached and provides that the contracts when made shall be in force for a period of two years, to end Mar. 31, 1916.

The circular states:

The nonunion operators desire a strike in the organized fields so that they can obtain contracts. We were reliably informed that representatives of the nonunion oper-

ators of Kentucky, West Virginia, Pennsylvania and elsewhere, were in both Philadelphia and Chicago while the joint conferences were in session, doing all within their power to bring about a disagreement and a strike. And so, in view of the slack work generally, we are unwilling to play into the hands of the unorganized operations by going on strike, throwing the union mines idle and thus allowing the non-union fields to fill the markets with their coal.

The reports of the election must be sent to the international secretary not later than Tuesday, Apr. 21.

The joint scale committee of miners and operators of central Pennsylvania, which was in session for two weeks in Philadelphia trying to make a scale, adjourned on Saturday, Apr. 5, and will meet again after the decision by referendum is reached. The operators were unwilling to continue in session with the miners because the latter were not empowered to make a final settlement. There is some hope that the meeting will be able to reconvene about Apr. 24. Meanwhile the mines will continue to work as orders are received, but as business is not brisk, there is no prospect of steady work. The miners and operators in central Pennsylvania agree that the miners should have the same tonnage rate as in the two years past. The miners, however, want car pushing abolished. This the operators are unwilling to concede without a reduction in the contract rate.

Anthracite Section of American Institute of Mining Engineers

At a meeting of the anthracite section of the American Institute of Mining Engineers, R. V. Norris, of Wilkes Barre, was elected president, and four vice-presidents were also elected, each of whom is to have general direction of the section's activities in one of the coal fields. W. J. Richards, vice-president and general manager of the Philadelphia & Reading Coal & Iron Co., is to have general direction for the Southern coal field, Edwin Ludlow, vice-president and general manager of the Lehigh Coal & Navigation Co., for the Middle coal field, Arthur Storrs, mining and consulting engineer, for the Lackawanna Valley, and C. F. Huber, vice-president and general manager of the Lehigh & Wilkes Barre Coal Co., for the Wyoming Valley. Charles Enzian, mining engineer and the Government representative of the United States Bureau of Mines in the anthracite fields, was elected secretary-treasurer.

An executive committee was formed, consisting of Frank Hill, a coal operator, R. A. Quin, vice-president and general manager of the Susquehanna Coal Co., R. J. Foster, vice-president International Correspondence Schools, A. B. Jessup, vice-president and general manager of the G. B. Markle Co., D. Bunting, chief engineer of the Lehigh & Wilkes Barre Coal Co., and J. M. Humphrey, mining engineer of the Lehigh Valley Coal Co.

A request from the president of State College was read at this meeting, asking that three delegates be appointed by the society to vote at the annual election for trustee.

Douglas Bunting was elected chairman of the committee to select the subject for discussion at the next meeting. The committee selected "The Limits of Mining under Heavy Wash," and J. M. Humphrey will also read a special paper on strippings. The meeting will be held on Saturday evening, May 9, at 7:30 in the Auditorium of the Lehigh & Wilkes-Barre office building at Wilkes-Barre, Pa.

Discussion By Readers

Straightforwardness in Mine Inspection

I was much impressed with the frank and manly statements quoted in the brief review of Mine Inspector McGregor's report, *COAL AGE*, Mar. 21, p. 474. I think these brief statements are the clearest and most direct that I have ever observed as coming from a mine inspector.

While commending Mr. McGregor on the straightforward, frank manner in which he states facts and truths that every mining man knows but that few have the courage to assert, I must also give *COAL AGE* due credit for giving to these statements a wider publicity than they would otherwise have and which they truly deserve. By this means, the statements are brought home to the men who should profit most by the opinions so frankly stated. There is too often a tendency to restrict the publication of frank and honest statements relating to actual facts and existing conditions. These must be known and appreciated in order to properly stimulate the many worthy efforts that are now being made on such an extended scale to increase safety in the mines.

It is a matter of common observation that mine inspectors' reports are too often stereotyped forms, consisting of printed blanks filled in with figures and supplemented by perfunctory statements that reveal little or nothing of the real knowledge and conviction of the man making the report. The public have a right to know the honest, candid opinions and conclusions of the men entrusted with the work of inspection and who are best qualified to place the blame for existing dangerous conditions or accidents where it properly belongs. Such candid reports would represent a consensus of opinions of qualified men that could be used as a basis on which to devise means for greater safety.

The Court of Public Opinion is far more powerful than the law itself to eradicate evil, lessen danger and reduce the accident list. The "hush" policy is wrong in principle, as it obstructs the formation of correct public opinion. Only by a frank, open statement of facts, in the technical press, can the misrepresentation and exaggerated statements of the secular journals be corrected. It is such misstatements and wrong viewpoints that often go far toward undoing the work that has been accomplished in the interest of safety. Every state mine official is the paid servant of the people, and loyalty to the trust confided to him should always compel a frank, conscientious statement of his honest convictions.

That the general reticence of mine inspectors is always the result of restrictions placed upon them by their superiors in state office is hardly conceivable. It has been my good fortune to know intimately a number of miners and mining men who have risen from the ranks to the position of mine inspector. While these men, in a subordinate position, were frank and outspoken in reference to the existence of a wrong or dangerous condition, in most cases they have shut up like clams when they have risen

to the position of mine inspector. Let us hope that this mistaken policy will be abandoned by many in the future and that more will follow the path dictated by their honest convictions.

SIM. C. REYNOLDS.

Houston, Penn.

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The Certificate Law

Letter No. 26—I have been pleased to note that the question of an interstate certificate law, which I suggested for consideration in *COAL AGE*, some time since, has been discussed so thoroughly. The discussion has proved most interesting, and I am pleased to note that the majority of the writers seem to favor the proposed interchange of certificates between states.

I cannot agree with the suggestion that the practice would be "harmful;" on the contrary, I consider it would be an inspiring incentive to every man desiring to extend his knowledge and experience beyond the narrow limits to which he is confined in his own state. As well might a sea captain be required to have a navigator's license to sail every sea and navigate every coast line as for a capable mine foreman holding a state certificate, to be required to pass examination before he can hold the same position in another state.

In respect to physical conditions in coal mining, state lines have no existence; and conditions are more or less alike in the various coal-mining districts. Flat and pitching seams, gaseous and nongaseous mines, are quite generally distributed; and methods of working, mining machinery and equipment, and mining laws are very much the same everywhere. The various nationalities of the miners present the same difficulties in one place as in another.

If these facts are generally conceded there would seem to be no tangible reason why coal-mining states should hesitate to make provision for an interstate certificate law. Not only would this open a wider field to students of mining, as suggested; but operators would benefit by such a law, since it would afford them a wider territory from which to select men of intelligence and ability.

The province of Alberta, Canada, has recently passed a law, authorizing the issuing of a certificate of competency to all applicants who hold a similar certificate granted in another country, provided the examining board in Alberta certifies that the standard of training and examination required by the foreign certificate is equivalent to that required in their own province. (*COAL AGE*, Apr. 4, p. 584.) Certificates of competency granted in England are good in all her territorial possessions, notwithstanding her supposed insularism.

A little reflection forces upon us the conviction that the restrictions and limitations of our mining laws are, in this respect, an obstacle to progress and the gaining of wider experience. Men who have proved their ability and success in coal mining and who already possess a certificate of competency of the required standard should

not be classed in the same category with the student whose experience is yet to be gained and whose ability is yet to be proved.

The spirit of a law making state-line limitations possible, in the matter of the recognition of industrial experience and ability, is, to say the least, unreasonable and un-American. It is to be hoped that this discussion will be the means of enlisting the interest of lawmakers and that an enactment may be secured that will broaden the field to mining men.

CHARLTON DIXON.

Pittsburgh, Penn.

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Working Coal under Watery Strata

Letter No. 6—The inquiry of George McPhail, *COAL AGE*, Jan. 3, p. 30, in regard to working a coal seam under a watery strata, and the later discussion by readers, has been of more than ordinary interest to me. I have just completed the sinking of a shaft here at Lehigh, Mont., under conditions very similar to those described by Mr. McPhail, with the exception that the coal seam here is 13 ft. in thickness, instead of 3 or 4 ft., as he states.

The information given regarding the geological cross-section of the country, and which would be of great assistance in intelligently answering this inquiry, as remarked by the editor at the time, was lacking. It would be feasible to assume that the shafts to be sunk are located in a basin, at or near the bottom of a synclinal trough. Taking these to be the existing conditions, geologically, I offer the following as my opinion and answer to the several queries submitted.

I believe that if the sandstone is broken, large quantities of water would flow into the mine, as the resulting caves would expose a much greater surface through which the water would find an easy channel into the workings. I also believe that a coal seam or mine of this kind would encounter large inflows of water wherever any displacement has occurred in the overlying strata, producing faults or large joints, which frequently cut across the bedding planes of coal seams. The inflow would be greater or less than the inflow into the shaft, according to the relative position of the break with respect to the shaft, the porosity and fissures in the sandstone. As will be noted from the statement of Mr. McPhail, the shaft did not affect the supply of water from the drillhole located only 50 ft. away. It seems evident that the whole of the formation of water-bearing sandstone, in this case, is practically one large reservoir, which will have to be drained in order to reduce the inflow of water into the mine, and I am of the opinion that, as the head of water in this basin is lowered, there will be a relative reduction in the inflow of water into the shaft and workings.

In answer to the second question, I consider that, in a mine located under the conditions described, the management should make arrangements and be prepared to handle large inflows of water, in case of emergency. Large sumps should be provided and equipped with up-to-date pumping machinery. A good, efficient pumping system I always consider a valuable asset and investment for any company operating under these conditions.

Replying to the third question, I am of the opinion

that the hoisting shaft, which is to be sunk, will encounter just as large a quantity of water as the air shaft sunk previously and possibly more if it has a larger area, unless the water has been drained in the meantime, in this basin, which is not probable, as the main hoisting shaft is generally sunk as soon as possible, so that it can be used in the development of the mine and for a second opening and ventilating purposes.

In reference to leaving about 50 per cent. of the coal in place, in order to prevent breaking the sandrock, I believe that a system of working could be adopted, in a thin seam of coal 3 or 4 ft. thick, that would make it unnecessary to lose any large percentage of the coal.

I consider that the safest method of working to adopt would be to open up the mine on a pillar-and-stall system, and then systematically flush the excavated area. In a thin seam of this kind there would be a large amount of material available for stowing in the workings, as the haulageways, roadways and airways would have to be brushed to a sufficient height, say 7 ft. This would produce quite a large amount of material and reduce in proportion the amount of material required to flush the workings. This system, when practicable, is the safest method to install that I know of, and is being used with success in quite a large number of mining districts today.

On the Continent, in Upper Silesia, over a hundred collieries have installed the hydraulic-packing or flushing system, in seams varying from 4 to 40 ft. in thickness, and have reduced the subsidence, which formerly varied from 30 to 70 per cent. down to a range of from 0.3 to 7.8 per cent. of the total thickness of the seams. In Essen, Germany, the Krupp firm is successfully extracting, from underneath their railway works, railways and large public buildings, 8 seams of coal, varying from 20 in. to 5½ ft., in thickness. They are enabled to do this with impunity, owing to the completeness with which the workings are filled with flushed material. Another method of working I would suggest, is to open up the workings on a pillar-and-stall, panel system, the entire panel to be surrounded by substantial pillars, which should have as few openings as practically possible and a minimum area. When the stalls are completed, in a panel, all the pillars should be withdrawn as rapidly as possible, precautions being taken to have good permanent stoppings built in all openings possible, surrounding the excavated area; and preparations made, in openings necessary for transportation and ventilation, so that in case of an inflow of water they may be quickly closed, thereby sealing up the excavated territory.

By experimenting with one or two panels of this kind, the action of the roof, and the effect it would have on the watery zone overlying the seam, would be practically demonstrated to the management, without their leaving in a large percentage of the coal seam. Then, if the expected or unexpected happened, they would be in a position to combat it successfully. They would also be prepared to adopt a system that would be suitable to the conditions which presented themselves. However, in conclusion I wish to state that the successful working of any coal property where adverse conditions present themselves will depend to a great extent upon the practical knowledge and judgment of the officials in charge.

J. W. POWELL, Supt.,
The Cottonwood Coal Co.

Windham, Mont.

Standardization of Mine-Track Gages

I noted with interest the request for a general discussion of the question of the standardization of track gages in mine haulage, *COAL AGE*, Mar. 21, p. 494. This is a many-sided question. It would be a simple matter to standardize track gages in mines, provided all coal seams were of the same thickness and other conditions relating to roof, coal and floor and the area to be worked were the same in all mines.

It is a well known fact that conditions in mines must largely govern the adoption of a fixed track gage. In the working of a 5-ft. seam, it would not be practicable to use the same track gage that would be adopted for similar conditions in a 7-ft. seam. In each case, the mine cars are built in proportions that are adapted to the special requirements, with a view to making the work of moving the cars as easy as possible for both men and animals. For this reason, in a 5-ft. vein, the track gage may vary, under ordinary conditions, from 18 to 36 in.; while, in a 7-ft. vein, a track gage varying from 36 to 44 in. would probably be used.

There are, besides, other conditions common to mining that determine the proper track gage. For instance, a

tender roof would hardly permit the use of a 40-in. gage, even in a 7-ft. seam of coal. To reduce the cost of maintaining roadways they must be driven narrow, under a tender roof. Then, as the mining law generally requires a sufficient clearance for men and animals at the side of the track, it is necessary to use a comparatively narrow gage. At the same time, under these conditions, due regard must be had for the proper proportionment of the cars.

In general, in the operation of a large mine covering a wide area and requiring a large daily output of coal, the capacity of the mine car is an important factor. While, in a large number of mines, cars having a capacity of from 35 to 45 bu. are in use, in other mines this capacity will often have to be increased to 50 and 60 bu., in order to meet the requirements of a large daily output, especially in mines having an extended area of workings. Cars having so large a capacity require track gages varying from 44 to 48 in.

When considering the question of standardization of mine-track gages, therefore, it is necessary to take into account all of these conditions and many others that are of equal importance with those mentioned.

PENNSYLVANIA ENGINEER.

Oliphant Furnace, Penn.

Study Course in Coal Mining

BY J. T. BEARD

The Coal Age Pocket Book

The use of the "relative potential" value, in all calculations to determine the natural division of air between two or more airways, is one of the most important considerations in the saving of time and labor and avoiding unnecessary multiplicity of figures, which increases the opportunities for error and yields less accurate results. An example or two will serve to make this fact plain.

EXAMPLES IN NATURAL DIVISION

Example—An air current of 100,000 cu.ft. per min. is divided at the foot of the downcast shaft, between the following four air courses or splits, thereby providing two separate ventilation districts on each side of the shaft:

Split A,	8 × 12 ft., 6000 ft. long
Split B,	6 × 20 ft., 12,000 ft. long
Split C,	6 × 12 ft., 8000 ft. long
Split D,	4 × 6 ft., 1000 ft. long

All the splits are open to the free passage of the air, no regulators being used. (a) Find the natural division of the main air current or the quantity of air passing in each split. (b) What is the pressure due to this circulation? (c) What is the horsepower on the air?

Solution—(a) The first step is to calculate the relative pressure potential for each of the four air splits. The area, perimeter and length of each airway are as follows:

Split A,	a = 96 sq.ft.;	o = 40 ft.;	l = 6,000
Split B,	a = 120 sq.ft.;	o = 52 ft.;	l = 12,000
Split C,	a = 72 sq.ft.;	o = 36 ft.;	l = 8,000
Split D,	a = 24 sq.ft.;	o = 20 ft.;	l = 1,000

Instead of using these full values as when finding the true potential value of an airway, the lowest relative values for the areas, perimeters and lengths are used. These relative values are obtained by cancelling the common factors in the areas, perimeters and lengths, separately, which gives

Split A,	a = 4;	o = 10;	l = 6
Split B,	a = 5;	o = 13;	l = 12
Split C,	a = 3;	o = 9;	l = 8
Split D,	a = 1;	o = 5;	l = 1

The relative split potentials are then found as follows:

$$\begin{aligned}\text{Split A,} & 4\sqrt{\frac{4}{6 \times 10}} = 4\sqrt{\frac{1}{15}} = 4\sqrt{0.06666} = 0.258 \\ \text{Split B,} & 5\sqrt{\frac{5}{12 \times 13}} = 5\sqrt{\frac{5}{156}} = 5\sqrt{0.03205} = 0.179 \\ \text{Split C,} & 3\sqrt{\frac{3}{8 \times 9}} = 3\sqrt{\frac{1}{24}} = 3\sqrt{0.04166} = 0.204 \\ \text{Split D,} & 1\sqrt{\frac{1}{1 \times 5}} = \sqrt{\frac{1}{5}} = \sqrt{0.2} = 0.447\end{aligned}$$

Sum of relative potentials..... 1.088

The Coal Age Pocket Book

Since the quantity of air passing in each split, in natural division is proportional to the corresponding potential, the quantity ratio is equal to the potential ratio, which is true also for the sum of the quantities and the sum of the potentials. Thus, the ratio of the quantity (q) passing in any split, to the total quantity (Q) in circulation, is equal to the ratio of the corresponding split pressure potential (Xp), to the sum of all the split potentials (ΣXp).

$$\frac{q}{Q} = \frac{X_p}{\Sigma X_p}; \text{ which gives } q = \frac{X_p}{\Sigma X_p} Q$$

Therefore, substituting the relative potential values just found in this formula gives the following:

$$\text{Split A, } q_a = \frac{0.258}{1.088} \times 100,000 = 23,710 \text{ cu.ft. per min.}$$

$$\text{Split B, } q_b = \frac{0.179}{1.088} \times 100,000 = 16,450 \text{ cu.ft. per min.}$$

$$\text{Split C, } q_c = \frac{0.204}{1.088} \times 100,000 = 18,750 \text{ cu.ft. per min.}$$

$$\text{Split D, } q_d = \frac{0.447}{1.088} \times 100,000 = 41,090 \text{ cu.ft. per min.}$$

Total quantity..... 100,000 cu.ft. per min.

(b) Since the pressure is the same for all the splits, it can be calculated from any one of the given splits, by substituting the values for that split in the formula

$$p = \frac{k l o q^2}{a^3}$$

Thus, taking split A,

$$p = \frac{0.0000002 \times 6000 \times 40 \times 23,710^2}{96 \times 96 \times 96} = 3.05 \text{ lb. per sq.ft.}$$

(c) The horsepower on the air in the main entry, or the horsepower producing this circulation is, then,

$$H = \frac{Q p}{33,000} = \frac{100,000 \times 3.05}{33,000} = 9.24 \text{ hp.}$$

General Split Potential—The potential value for the combined splits must be calculated from the total quantity of air in circulation and the resulting pressure, using the formula

$$X^2_u = \frac{Q^2}{p}; \text{ or } X_u = \sqrt{\frac{Q^2}{p}}$$

Example—What is the general power potential for all the splits combined, in the example given above, where 100,000 cu.ft. of air was circulated under a pressure of 3.05 lb. per sq.ft.?

Solution—The general power potential for these combined splits is

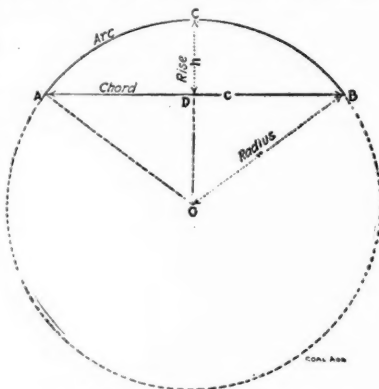
$$\text{Mine power potential, } X_u = \sqrt{\frac{Q^2}{p}} = \sqrt{\frac{100,000^2}{3.05}} = 1875$$

Inquiries of General Interest

Study Question--The Circle

Referring to the inquiry in reference to finding the area of a segment of a circle when the length of the chord and the rise of the arc are known, COAL AGE, Mar. 21, p. 500, I wish to submit the following simple solution that does not entail the use of trigonometry. The formula is taken from Des Ingenieurs Taschenbuch, 18th edition, Berlin, 1902, p. 34.

Referring to the accompanying figure, in which the length of the chord subtending the arc is c and its rise h , the radius of the circle being r , the length of the arc is first found by the formula.



THE SEGMENT OF A CIRCLE

$$arc = \sqrt{c^2 + 16/3 (h^2)}$$

Then, making $c = 12$, $h = 3$, and substituting these values in the formula we have

$$arc = \sqrt{12^2 + 16/3 (3^2)} = 13.86$$

The area of the sector ACBO is next found by multiplying the length of the arc ACB by one-half the radius of the circle. The radius of the circle being the hypotenuse of the right triangle ODB, its length is found as follows:

$$r^2 = (c/2)^2 + (r-h)^2$$

$$r = \frac{(c/2)^2 + h^2}{2h} = \frac{6^2 + 3^2}{2 \times 3} = 7.5 \text{ ft.}$$

The area of the sector ACBO is then $13.86 \times 7.5/2 = 51.975$ sq.ft. Subtracting from this the area of the triangle ABO, which is $c/2 (r-h) = 6 \times 4.5 = 27$ sq.ft., the area of the segment ACBD is $51.975 - 27 = 24.975$ sq.ft., approximately.

V. SRAJN,
Mining Engineer.

Hymera, Ind.

I noticed a request from "Reader," COAL AGE, Mar. 21, p. 500, for a formula for finding the area of a segment of a circle from the length of its chord and the rise of the arc, without the use of trigonometry. The following simple rule may be of use in the solution of this question:

RULE—Add together one-fourth of the square of the chord and two-fifths of the square of the rise of the arc. Multiply the square root of this sum by four-thirds of the rise of the arc.

Calling the chord subtending the arc c and the rise of the arc h , this rule is expressed by the formula:

$$area \text{ of segment} = 4/3 h \sqrt{c^2/4 + 2/5 (h^2)}$$

Then substituting the values $c = 12$; $h = 3$,

$$area \text{ of segment} = \frac{4 \times 3}{3} \sqrt{\frac{12^2}{4} + \frac{2}{5} (3^2)}$$

$$= 4 \sqrt{144 + 18} = 4 \sqrt{39.6} = 25.17 \text{ sq.ft.}$$

Cobalt, Canada.

JOHN MCPHEE.

Both of the solutions given above obtain more or less approximate results. To show the degree of approximation that can be obtained by the solution, COAL AGE, Mar. 21, p. 500, we will calculate the successive values for h_1 , h_2 , h_3 , etc., according to the method there explained, using Formula 3, for that purpose, which is

$$h_1 = r (1 - \sqrt{1 - h/2r})$$

In this formula, $r = 7.5$ ft. and $h = 3$ ft.; but the values h_1 , h_2 , h_3 , etc., are each in turn substituted for h , to obtain the next succeeding value, as follows:

$$h_1 = 7.5 (1 - \sqrt{1 - 3/15}) = 0.792$$

Again, substituting this value of h_1 for h , in the same formula, gives

$$h_2 = 7.5 (1 - \sqrt{1 - 0.792/15}) = 0.201$$

Likewise, substituting this value of h_2 for h , in the same formula, gives

$$h_3 = 7.5 (1 - \sqrt{1 - 0.201/15}) = 0.0504$$

Similarly, substituting consecutively the values for h_3 , h_4 , etc., the following values are obtained: $h_4 = 0.01261$; $h_5 = 0.003154$, nearly; $h_6 = 0.0007885$, nearly.

The length of a subarc or unit division can be calculated from any one of these values and such unit length multiplied by the corresponding number of subdivisions, to obtain the length of the full arc ACB. It is evident that if the work is carefully performed, the greater the number of subdivisions, the closer the result will approximate the true length of arc.

In any case, the length of arc is calculated by the formula

$$arc = 2^{n+1} \sqrt{2rh_n}$$

Multiplying the length of the arc ACB, as thus calculated, by one-half the radius of the circle will give the area of the sector ACBO; and, finally, subtracting the area of the triangle ABO (27 sq.ft.) from the area of this sector, will give the required area of the segment ACBD.

The lengths of the arc ACB, as calculated from the respective values of h_3 , h_4 , h_5 and h_6 , previously given, are as follows: 13.912; 13.918; 13.920; 13.920 ft., and the corresponding areas of the segment ACBD, as calculated in the manner previously described, are 25.17; 25.19; 25.20; 25.20 sq.ft. The last two values are, thus, practically identical and may be taken as being the closest possible approximation.

Examination Questions

Miscellaneous Questions

(Answered by Request)

Ques.—What is the total weight of an open tank 9 ft. long, 4 ft. wide and 2 ft. high, made of $\frac{3}{4}$ -in. boiler plate; allowing 8 per cent. additional weight for the flanges and assuming that 1 sq.ft. of boiler plate 1 in. thick weighs 45 lb.?

Ans.—The perimeter of the tank, or the measurement around the sides and ends is $2(9 + 4) = 26$ ft. The superficial surface of the sides and ends is then $2 \times 26 = 52$ sq.ft. To this must be added the area of the bottom of the tank, $4 \times 9 = 36$ sq.ft.; making the entire superficial surface of the tank $52 + 36 = 88$ sq.ft. For a $\frac{3}{4}$ -in. boiler plate, the corresponding weight of the iron in the tank is $\frac{3}{4}(45 \times 88) = 2970$ lb. Allowing 8 per cent. additional weight for the flanges makes the total weight of this tank $2970 \times 1.08 = 3207.6$ lb.

Ques.—(a) The course of the main entry of a mine is N 17° W; what is the course of a cross-entry turned to the right of the main entry, at an angle of 90 deg.? (b) What is the course of the rooms turned off this cross-entry, at an angle of $67^\circ 30'$, to the right?

Ans.—(a) The course of the main entry lying in the northwest quadrant and the cross-entry being turned to the right, its course is $90 - 17 = \text{N } 73^\circ \text{ E}$.

(b) The rooms being turned $67^\circ 30'$ to the right of the cross-entry, their course is found by adding this angle to the azimuth of the cross-entry, which gives for the azimuth of the rooms, $73^\circ + 67^\circ 30' = 140^\circ 30'$. Since this azimuth lies in the southeast quadrant, the corresponding bearing or course of the rooms is $180^\circ - 140^\circ 30' = \text{S } 39^\circ 30' \text{ E}$.

Ques.—Assuming a ventilating fan running at constant speed and having a constant manometric efficiency, in which case would this fan circulate the largest quantity of air: 1. When operating on four airways, each 4×5 ft. in section and 800 ft. long. 2. When operating on a single airway 8×10 ft. in section and 1600 ft. long?

Ans.—The four airways, 4×5 ft., 800 ft. long, have the same sectional area (80 sq.ft.) and the same rubbing surface (57,600 sq.ft.) as the single airway 8×10 ft., 1600 ft. long. The potentials of these airways and that of the circulation are, therefore, the same in each case; and the fan, running at the same speed, will have the same manometric efficiency and produce the same quantity of air, in each case.

Ques.—A mine sump is 62 ft. long, 11 ft. wide and 9 ft. deep and full of water. How long will it take a 6-in. pump to empty this sump, at a piston speed of 100 ft. per min., the efficiency of the pump being 80 per cent.?

Ans.—The sectional area of a 6-in. plunger or piston is $0.7854 \times 6^2 = 28.2744$ sq.in. At a speed of 100 ft. per min., the piston displacement of this pump is $28.2744 \times 100 \div 144 = 19.635$ cu ft. per min. Assuming an efficiency of the water end of the pump as 80 per cent.,

the pump will discharge $19.635 \times 0.80 = 15.708$ cu.ft. of water per min.

The capacity of the sump is $62 \times 11 \times 9 = 6138$ cu.ft. The time required for the pump to empty the sump is $6138 \div 15.708 = 390 + \text{min.}$, or 6 hr. 30 min.

Ques.—(a) Define the term "potential," as applied to electricity in mines. (b) Define the term "difference of potential," as applied to electricity. (c) Define the terms "low voltage," "medium voltage" and "high voltage," stating to what class of work each of these terms is applicable, for use in mines.

Ans.—(a) In electrical work, the term "potential" is commonly used as synonymous with voltage and refers to the pressure of the current, as measured by the voltage.

(b) The expression "difference of potential," in electricity, refers to the drop of pressure between two points of the circuit. This is referred to, also, as the "line drop." It is the loss due to the transmission of the current between two points, as, for example, from the generator to the machine to be operated.

(c) Where the conditions of the supply of electricity are such that the difference of potential between any two points in the circuit cannot exceed 300 volts, the Bituminous Mine Law of Pennsylvania (Art. II) would class the current as one of "low voltage." Where the conditions are such that the said difference of potential exceeds 300 volts, but cannot exceed 650 volts, the same law classes the current as one of "medium voltage." Where the conditions of supply are such that the difference of potential exceeds 650 volts, the current is classed by the same law, as one of "high voltage."

Owing to the danger of contact of men and animals with live wires, low-voltage currents are preferable in all mine work underground, except where it is necessary to reduce to a minimum the size of wire conductors or cost of copper, for the transmission of power to the working face. Medium-voltage currents are better adapted for the operation of most machinery on the surface, as, for example, air compressors, hoisting and haulage engines and fan motors. Medium voltage is also best adapted for transmission of electrical power underground; but, in all cases, conductors carrying such voltage should be insulated and otherwise safeguarded. High-voltage currents are chiefly used for long-distance transmission of power, on the surface and, in rare cases, underground.

In the transmission of electrical power, the size of wire or cost of copper is reduced to a minimum by the use of an alternating current of high voltage; but direct current is almost always employed for the operation of motors for haulage, coal cutting, hoisting or wherever a high-starting torque is required. In the use of electrical power, therefore, at a considerable distance from the generator, it is more economical to use a medium- or high-voltage, alternating current for transmission to the point where the power is required; and transform and "step down" this current, at that point, so as to obtain a direct current of low voltage for use in the machine.

Coal and Coke News

Washington, D. C.

The Committee on Mines and Mining in the House of Representatives has begun a new inquiry into certain phases of the Colorado strike situation by calling before it John D. Rockefeller, Jr., and questioning him concerning the Rockefeller interests in the Colorado region. Mr. Rockefeller in testifying on Monday, Apr. 6, said that he was one of his father's representatives in care of his investments in the Colorado Fuel & Iron Co., in which J. D. Rockefeller, Sr., held about 40 per cent. of the common and preferred stock and about 50 per cent. in all of the bonds.

Mr. Rockefeller, Jr., did not know much about the holdings of other stockholders but he described the relationship between L. M. Bowers and the Rockefeller interests by saying that "he came to us and asked us if we had any interests in which he could be of service in the West, and knowing him to be of great value as a business man we asked him to investigate some investments we had in the far West at the time. This he did. Then he said he was to live in Denver, and we were glad to have him care for our interests there. He was first treasurer of the company and afterward made chairman of the board and this was done by the board itself without any knowledge on our part. I mention this to show you that he has been retained by the board because his long continued relationship with the company has been of great value to the enterprise."

When asked whether he was a dummy director, Mr. Rockefeller said that his practice was to get the best men that could be had and then stand by them. He himself had rarely attended the directors' meetings. When questioned with respect to the labor conditions in Colorado he said he had been impressed with the extensive welfare work that had been done by the Colorado Fuel & Iron Co. and offered to file the correspondence with the concern during the time the trouble culminating in the recent strike was in progress.

Mr. Rockefeller rejected the idea that he had only a passing interest in the situation in Colorado and asserted that he thought Mr. Bowers was the best man to handle the situation. He had not gone to Colorado himself because he preferred, as previously stated, to leave practical details in the hands of skilled men who were capable of dealing thoroughly with them, holding such men responsible for the results actually secured.

The hearing is to be continued with other witnesses concerning the circumstances under which existing conditions in the mining regions developed.

Amendments to the Mining Law

Senator Walsh Chairman of the Committee on Mines and Mining has offered a bill amending section 2348 of the Revised Statutes so as to read as follows:

Sec. 2348. Any person, or any corporation organized under the laws of the United States, or of any state, or municipality, or municipal subdivision of any state, as above provided, who have opened and improved, or shall hereafter open and improve, any coal mine or mines upon the public lands, and shall be in actual possession of the same, shall be entitled to a preference right of entry under the preceding section, of the mines so opened and improved.

It is believed that this bill or one to the same general effect will be acted upon by the Committee.

Senator Walsh has also offered a bill for the amendment of section 2347, Revised Statutes so as to make it read as follows:

Sec. 2347. Every person above the age of twenty-one years, who is a citizen of the United States, or who has declared his intention to become such, or any corporation organized under the laws of the United States, or of any state, or municipality, or municipal subdivision of any state, shall, upon application to the register of the proper land office, have the right to enter, by legal subdivision, any quantity of vacant coal lands of the United States not otherwise appropriated or reserved by competent authority, not exceeding 1280 acres, upon payment to the receiver of not less than \$10 per acre for such lands, where the same shall be situated more than fifteen miles from any completed railroad, and not less than \$20 per acre for such lands as shall be within fifteen miles of such road.

In addition to this he proposes to change section 2350 so as to authorize only one entry by the same person or corporation.

Harrisburg, Penn.

Further testimony to show that additional competition in the transportation of anthracite coal from the Schuylkill region would not be commercially feasible was given on Mar. 31, by A. T. Dice, general manager and vice-president of the Philadelphia & Reading Ry. Co., at the resumption of hearings for the defense in the Government's anti-trust suit against the Reading system and other anthracite interests.

It was brought out that surveys made in 1906 showed the construction of a railroad across the Broad Top Mountain to supersede the Mahanoy Plane would cost \$7,500,000. The same construction, if undertaken now, it was asserted, would involve an expenditure of \$9,000,000.

The old question of the abandonment of the Schuylkill Canal was brought up by the Government attorneys who endeavored to obtain from Mr. Dice an admission that the canal had been "designedly abandoned." Mr. Dice said that he knew of no canal that is now commercially successful. The Reading, he said, discontinued the use of the Schuylkill Canal because, although actual transportation of coal via the canal might be cheaper than by rail, the difficulties of loading and unloading and the distance of the canal from the collieries and coal yards, more than compensated any advantage, and made the canal route, as a whole, the more costly.

The decline, and finally the almost total elimination of the Schuylkill Canal as a factor in the transportation of anthracite coal, were explained by Edwin F. Smith, formerly superintendent of that property, as being due solely to economic causes. Although he said the users of coal preferred to receive it by rail, and that this preference ended the canal's career, he denied that the canal ever had been competitive with the Reading Railway. Mr. Coudert at last brought his cross-examination of Mr. Smith to the point where the latter admitted that every one else might call it competition, but still he would not.

Although the Pennsylvania Railroad is not a party to the suit, Robert H. Large, general coal freight agent of that company, testified as a witness for the defense. He said it is not the policy of his company to enter into joint rates with other carriers along whose lines bituminous coal is produced. He defended the right of the company, in the absence of compulsion by the Interstate Commerce Commission to endeavor to conserve its bituminous trade. Joint rates on anthracite coal, he maintained, inured to the public benefit.

Admission that the Reading Coal & Iron Co. is favored above other shippers of anthracite by the Reading Railway in the matter of extension of credit for freight charges was made on Apr. 3, by W. G. White, comptroller of the railway company.

Mr. White conceded, under cross examination, that the Reading Coal & Iron Co., gave no bonds, a privilege extended to only one or two shippers. He could recall no others which were given credit to the extent of as much as \$100,000 for 60 to 90 days. Mr. Coudert, counsel, for the Government, read into the records accounts of the railway company showing an indebtedness of recent years running as high as \$1,500,000 on the part of the Coal and Iron Co.

PENNSYLVANIA

Anthracite

Duryea—Suit has been entered against the Pennsylvania Coal Co., by A. B. Brown, who asks \$5000 damages to his property caused by mine water. He claims that in the year 1908 the coal company sunk a bore hole near his property and has since pumped out a large quantity of water which at times overflows a small water course and enters upon his property causing culm, refuse, etc., to be deposited thereon.

Locust Gap—In a fire at Alaska Shaft early on Apr. 1, Thomas Graham and William McCoy, fire bosses were badly burned. A large number of men formed a fire-fighting force. The blaze grew rapidly but was finally gotten under control.

Cranberry—The mine workers at the collieries of A. Pardee & Co. threatened, on Apr. 2, to strike unless about 40 of the men back in their union dues paid up within the next week. "Button" troubles have recently occurred at a number of the mines in this vicinity, but there have been no strikes to enforce payment of dues.

Bituminous

Charleroi—The Charleroi mine of the Carnegie Coal Co. resumed work Apr. 2 with approximately 500 men. This number will be increased as miners become available.

Washington—Despite the counsel of the Official Board of District No. 5 of the United Mine Workers there were on Apr. 3 over 20,000 mine workers idle in Washington County. Of these all but about 800 quit because they did not wish to continue work until the wage scale was decided.

Connellsville—A considerable section of the state road just south of Poplar Grove in Connellsville Township recently collapsed into an abandoned mine.

Butler—Because the Erie Coal & Coke Co. refused to accede to their demands for an eight hour day 250 miners employed at Ferris went on strike recently. This and other mines in the Hilliards district have been working under union scale and conditions except as to hours of labor for the past three years.

WEST VIRGINIA

Wheeling—Since the strike of the Ohio coal miners was declared a migration of foreigners from the idle fields has been in progress. It is believed that the majority of the foreigners in the 5th Ohio Sub-District will be gone by the last of the month if the strike is not settled by that time.

The effects of this coal strike are declared to be wide spread affecting many lines of business other than mines. The railroads are hard hit and a conservative figure by a railroad official is that a million dollars a month will only about approximate the loss to the roads. There is also the loss to the employees through slack work which is considerable.

Colliers—Thirteen demands are presented by the striking miners of the Pittsburgh & West Virginia Coal Co. for consideration by the Board of Arbitration which Governor Hatfield proposes to name. Among the most important of these are recognition of the Union and an eight-hour day.

KENTUCKY

Louisville—The conference of Western Kentucky coal operators and miners was brought to an abrupt conclusion by the operators' ultimatum that no concessions involving an increased cost of production would be considered. Further negotiations will be carried on through the Joint Scale Committee. Meanwhile the 6000 miners affected will continue working under the 1912 agreement.

Lexington—The College of Mining of the State University has announced details of its short course in coal mining, which started Apr. 1 and will continue to May 27. Instruction will be given in the following work: Study of different mining systems, laying out for mining, and methods for thin and thick, flat and pitching seams; blasting, covering various explosives and the evils of improper blasting; machine mining; supporting excavations, including the principles of timbering; ventilation, with a study of the different methods and of coursing, splitting and regulating the current; the use of anemometers, water gages and other mine equipment; and mine rescue work.

Madisonville—About 150 miners employed by the Kingdom Coal Co. went out on strike Mar. 31, on the refusal of the company to grant wage increases and other demands made by the men. This mine was recently unionized, as far as the greater number of the men were concerned. It is reported that a number of them were discharged for this reason, and that this is one of the causes of the strike.

OHIO

Bridgeport—The miners of Belmont and Jefferson counties, 15,000 of whom are on strike, are apparently preparing for a struggle which may last six months or longer. Thousands are seeking temporary employment to tide them over the strike period.

East Liverpool—The Island Run coal mine which has been operated for a number of years by the Tri-State Ry. Co. recently discontinued operations. This mine has been the main source of fuel for the street car company for a number of years and employed from 40 to 50 men working in two shifts of 8 hr. each.

Columbus—Figures have been prepared by a number of Hocking Valley and Pomeroy Bend operators showing the real difference in cost of mining under the screen system and the mine-run system. These figures will likely play an important part in the negotiations for the renewal of the mining scale after the question of the constitutionality of the mine-run law is decided. They show that under present conditions the cost of mining in the thin vein district of Pennsylvania would be \$0.6464, and in the thick vein district, \$0.5611. In the meantime miners are trying to show that \$0.71 3-7 would be an equitable basis for coal mined in the Hocking Valley, No. 8, and Cambridge fields of Ohio. On a machine mining basis the thin vein district of Pennsylvania would pay \$0.4461 for cutting, drilling, timbering and loading and the rate in the thick vein district would be \$0.3892. The rates which are being discussed in the Hocking Valley are \$0.4928; in No. 8, \$0.4517, and in Cambridge, \$0.4140. These figures tend to show that Ohio is being discriminated against in many ways.

Coshocton—Harry Daly recently made a discovery of a four-foot bed of cannel coal on the Stockum farm located about two miles east of Coshocton. Arrangements are being made to open a mine in the territory.

INDIANA

Indianapolis—A circular sent out from the International Headquarters at Indianapolis and made public Apr. 3, calls for a referendum vote on Apr. 14 upon the decision of the miners' representatives at the conference recently held in Chicago to withdraw wage demands and recommending that such questions as working conditions which the miners feel are in need of adjustment should be taken up with operators locally, the miners meantime to remain at work. If this decision is ratified it will mean industrial peace, if not, a more or less extended strike.

Terre Haute—Mine workers of district No. 11 met here Apr. 6, as an adjourned session of the biennial convention, to decide on the demands of miners, to be presented to a joint convention of miners and operators Apr. 9. There will be no formal suspension of work in the mines.

Brazil—At a meeting of the joint boards of operators and miners in the block coal fields, it was agreed to work the mines pending the settlement of wage and other differences. The operators are reported to have considerable coal on hand.

Sullivan—A suit to test the question of whether a landowner conveys oil and gas rights when he sells the coal under his land has been filed in the Circuit Court here by the Sullivan Gas & Oil Co. which has leased land, to drill for oil and gas but owners of the coal under the land have also begun drilling for oil.

Vincennes—The Indian Creek Coal Mining Co., operating the largest mine in Indiana, claims the hoisting record of the state, having in eight hours hauled to the surface 3104 tons, beating the mine's previous record by one ton.

ILLINOIS

Harrisburg—The route for the Miners' Examining Board of Illinois for the month of April is as follows: Spring Valley, Apr. 2; Canton, Apr. 3; Peoria, Apr. 4; Danville, Apr. 9; Pana, Apr. 14; Springfield, Apr. 15 and 16; Stanton, Apr. 17; Breese, Apr. 23; Belleville, Apr. 24; Eldorado, Apr. 26; Duquoin, Apr. 29; Herrin, Apr. 30.

Ottawa—Twelve hundred men are idle as a result of closing down the coal mines at La Salle, Peru, Oglesby, Jonesville, and Cedar Point. This shut down was caused by an over-stocked market, many big consumers fearing a strike having stored many tons of coal.

Peoria—The Illinois coal operators on Apr. 3 refused to grant the demands made by the miners and presented a counter-petition to the latter containing clauses which not only lower the present scale of wages, but which provide for easier working conditions as a means of decreasing the cost of production.

Chicago—Five hundred English, Welsh, Irish and Scotch miners who had been employed for some time in Illinois and Indiana coal fields left Chicago Apr. 2 on a special train for Halifax, Nova Scotia, where they will embark for their old homes. They are taking advantage of a shut down in the mines to visit relatives across the sea.

MISSOURI

Midway—A 14-ft. bed of coal was recently discovered on the Newlin lease of the American Zinc, Lead & Smelting Co. The coal was first encountered at a depth of 28 ft. and continued to a depth of 42 ft. It is said to be one of the biggest deposits ever found in the Joplin district.

Coal and Coke News

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Mr. Rockefeller, Jr., did not know much about the holdings of other stockholders but he described the relationship between L. M. Bowers and the Rockefeller interests by saying that "he came to us and asked us if we had any interests in which he could be of service in the West, and knowing him to be of great value as a business man we asked him to investigate some investments we had in the far West at the time. This he did. Then he said he was to live in Denver, and we were glad to have him care for our interests there. He was first treasurer of the company and afterward made chairman of the board and this was done by the board itself without any knowledge on our part. I mention this to show you that he has been retained by the board because his long continued relationship with the company has been of great value to the enterprise."

When asked whether he was a dummy director, Mr. Rockefeller said that his practice was to get the best men that could be had and then stand by them. He himself had rarely attended the directors' meetings. When questioned with respect to the labor conditions in Colorado he said he had been impressed with the extensive welfare work that had been done by the Colorado Fuel & Iron Co. and offered to file the correspondence with the concern during the time the trouble culminating in the recent strike was in progress.

Mr. Rockefeller rejected the idea that he had only a passing interest in the situation in Colorado and asserted that he thought Mr. Bowers was the best man to handle the situation. He had not gone to Colorado himself because he preferred, as previously stated, to leave practical details in the hands of skilled men who were capable of dealing thoroughly with them, holding such men responsible for the results actually secured.

The hearing is to be continued with other witnesses concerning the circumstances under which existing conditions in the mining regions developed.

Amendments to the Mining Law

Senator Walsh Chairman of the Committee on Mines and Mining has offered a bill amending section 2348 of the Revised Statutes so as to read as follows:

Sec. 2348. Any person, or any corporation organized under the laws of the United States, or of any state, or municipality, or municipal subdivision of any state, as above provided, who have opened and improved, or shall hereafter open and improve, any coal mine or mines upon the public lands, and shall be in actual possession of the same, shall be entitled to a preference right of entry under the preceding section, of the mines so opened and improved.

It is believed that this bill or one to the same general effect will be acted upon by the Committee.

Senator Walsh has also offered a bill for the amendment of section 2347, Revised Statutes so as to make it read as follows:

Sec. 2347. Every person above the age of twenty-one years, who is a citizen of the United States, or who has declared his intention to become such, or any corporation organized under the laws of the United States, or of any state, or municipality, or municipal subdivision of any state, shall, upon application to the register of the proper land office, have the right to enter, by legal subdivision, any quantity of vacant coal lands of the United States not otherwise appropriated or reserved by competent authority, not exceeding 1280 acres, upon payment to the receiver of not less than \$10 per acre for such lands, where the same shall be situated more than fifteen miles from any completed railroad, and not less than \$20 per acre for such lands as shall be within fifteen miles of such road.

In addition to this he proposes to change section 2350 so as to authorize only one entry by the same person or corporation.

Harrisburg, Penn.

Further testimony to show that additional competition in the transportation of anthracite coal from the Schuylkill region would not be commercially feasible was given on Mar. 31, by A. T. Dice, general manager and vice-president of the Philadelphia & Reading Ry. Co., at the resumption of hearings for the defense in the Government's anti-trust suit against the Reading system and other anthracite interests.

It was brought out that surveys made in 1906 showed the construction of a railroad across the Broad Top Mountain to supersede the Mahanoy Plane would cost \$7,500,000. The same construction, if undertaken now, it was asserted, would involve an expenditure of \$9,000,000.

The old question of the abandonment of the Schuylkill Canal was brought up by the Government attorneys who endeavored to obtain from Mr. Dice an admission that the canal had been "designedly abandoned." Mr. Dice said that he knew of no canal that is now commercially successful. The Reading, he said, discontinued the use of the Schuylkill Canal because, although actual transportation of coal via the canal might be cheaper than by rail, the difficulties of loading and unloading and the distance of the canal from the collieries and coal yards, more than compensated any advantage, and made the canal route, as a whole, the more costly.

The decline, and finally the almost total elimination of the Schuylkill Canal as a factor in the transportation of anthracite coal, were explained by Edwin F. Smith, formerly superintendent of that property, as being due solely to economic causes. Although he said the users of coal preferred to receive it by rail, and that this preference ended the canal's career, he denied that the canal ever had been competitive with the Reading Railway. Mr. Coudert at last brought his cross-examination of Mr. Smith to the point where the latter admitted that every one else might call it competition, but still he would not.

Although the Pennsylvania Railroad is not a party to the suit, Robert H. Large, general coal freight agent of that company, testified as a witness for the defense. He said it is not the policy of his company to enter into joint rates with other carriers along whose lines bituminous coal is produced. He defended the right of the company, in the absence of compulsion by the Interstate Commerce Commission to endeavor to conserve its bituminous trade. Joint rates on anthracite coal, he maintained, inured to the public benefit.

Admission that the Reading Coal & Iron Co. is favored above other shippers of anthracite by the Reading Railway in the matter of extension of credit for freight charges was made on Apr. 3, by W. G. White, comptroller of the railway company.

Mr. White conceded, under cross examination, that the Reading Coal & Iron Co., gave no bonds, a privilege extended to only one or two shippers. He could recall no others which were given credit to the extent of as much as \$100,000 for 60 to 90 days. Mr. Coudert, counsel, for the Government, read into the records accounts of the railway company showing an indebtedness of recent years running as high as \$1,500,000 on the part of the Coal and Iron Co.

PENNSYLVANIA

Anthracite

Duryea—Suit has been entered against the Pennsylvania Coal Co., by A. B. Brown, who asks \$5000 damages to his property caused by mine water. He claims that in the year 1908 the coal company sunk a bore hole near his property and has since pumped out a large quantity of water which at times overflows a small water course and enters upon his property causing culm, refuse, etc., to be deposited thereon.

Locust Gap—In a fire at Alaska Shaft early on Apr. 1, Thomas Graham and William McCoy, fire bosses were badly burned. A large number of men formed a fire-fighting force. The blaze grew rapidly but was finally gotten under control.

Cranberry—The mine workers at the collieries of A. Pardee & Co. threatened, on Apr. 2, to strike unless about 40 of the men back in their union dues paid up within the next week. "Button" troubles have recently occurred at a number of the mines in this vicinity, but there have been no strikes to enforce payment of dues.

Bituminous

Charleroi—The Charleroi mine of the Carnegie Coal Co. resumed work Apr. 2 with approximately 500 men. This number will be increased as miners become available.

Washington—Despite the counsel of the Official Board of District No. 5 of the United Mine Workers there were on Apr. 3 over 20,000 mine workers idle in Washington County. Of these all but about 800 quit because they did not wish to continue work until the wage scale was decided.

Connellsville—A considerable section of the state road just south of Poplar Grove in Connellsville Township recently collapsed into an abandoned mine.

Butler—Because the Erie Coal & Coke Co. refused to accede to their demands for an eight hour day 250 miners employed at Ferris went on strike recently. This and other mines in the Hilliards district have been working under union scale and conditions except as to hours of labor for the past three years.

WEST VIRGINIA

Wheeling—Since the strike of the Ohio coal miners was declared a migration of foreigners from the idle fields has been in progress. It is believed that the majority of the foreigners in the 5th Ohio Sub-District will be gone by the last of the month if the strike is not settled by that time.

The effects of this coal strike are declared to be wide spread affecting many lines of business other than mines. The railroads are hard hit and a conservative figure by a railroad official is that a million dollars a month will only about approximate the loss to the roads. There is also the loss to the employees through slack work which is considerable.

Colliers—Thirteen demands are presented by the striking miners of the Pittsburgh & West Virginia Coal Co. for consideration by the Board of Arbitration which Governor Hatfield proposes to name. Among the most important of these are recognition of the Union and an eight-hour day.

KENTUCKY

Louisville—The conference of Western Kentucky coal operators and miners was brought to an abrupt conclusion by the operators' ultimatum that no concessions involving an increased cost of production would be considered. Further negotiations will be carried on through the Joint Scale Committee. Meanwhile the 6000 miners affected will continue working under the 1912 agreement.

Lexington—The College of Mining of the State University has announced details of its short course in coal mining, which started Apr. 1 and will continue to May 27. Instruction will be given in the following work: Study of different mining systems, laying out for mining, and methods for thin and thick, flat and pitching seams; blasting, covering various explosives and the evils of improper blasting; machine mining; supporting excavations, including the principles of timbering; ventilation, with a study of the different methods and of coursing, splitting and regulating the current; the use of anemometers, water gages and other mine equipment; and mine rescue work.

Madisonville—About 150 miners employed by the Kingdom Coal Co. went out on strike Mar. 31, on the refusal of the company to grant wage increases and other demands made by the men. This mine was recently unionized, as far as the greater number of the men were concerned. It is reported that a number of them were discharged for this reason, and that this is one of the causes of the strike.

OHIO

Bridgeport—The miners of Belmont and Jefferson counties, 15,000 of whom are on strike, are apparently preparing for a struggle which may last six months or longer. Thousands are seeking temporary employment to tide them over the strike period.

East Liverpool—The Island Run coal mine which has been operated for a number of years by the Tri-State Ry. Co. recently discontinued operations. This mine has been the main source of fuel for the street car company for a number of years and employed from 40 to 50 men working in two shifts of 8 hr. each.

Columbus—Figures have been prepared by a number of Hocking Valley and Pomeroy Bend operators showing the real difference in cost of mining under the screen system and the mine-run system. These figures will likely play an important part in the negotiations for the renewal of the mining scale after the question of the constitutionality of the mine-run law is decided. They show that under present conditions the cost of mining in the thin vein district of Pennsylvania would be \$0.6464, and in the thick vein district, \$0.5611. In the meantime miners are trying to show that \$0.71 3-7 would be an equitable basis for coal mined in the Hocking Valley, No. 8, and Cambridge fields of Ohio. On a machine mining basis the thin vein district of Pennsylvania would pay \$0.4461 for cutting, drilling, timbering and loading and the rate in the thick vein district would be \$0.3892. The rates which are being discussed in the Hocking Valley are \$0.4928; in No. 8, \$0.4517, and in Cambridge, \$0.4140. These figures tend to show that Ohio is being discriminated against in many ways.

Coshocton—Harry Daly recently made a discovery of a four-foot bed of cannel coal on the Stockum farm located about two miles east of Coshocton. Arrangements are being made to open a mine in the territory.

INDIANA

Indianapolis—A circular sent out from the International Headquarters at Indianapolis and made public Apr. 3, calls for a referendum vote on Apr. 14 upon the decision of the miners' representatives at the conference recently held in Chicago to withdraw wage demands and recommending that such questions as working conditions which the miners feel are in need of adjustment should be taken up with operators locally, the miners meantime to remain at work. If this decision is ratified it will mean industrial peace, if not, a more or less extended strike.

Terre Haute—Mine workers of district No. 11 met here Apr. 6, as an adjourned session of the biennial convention, to decide on the demands of miners, to be presented to a joint convention of miners and operators Apr. 9. There will be no formal suspension of work in the mines.

Brazil—At a meeting of the joint boards of operators and miners in the block coal fields, it was agreed to work the mines pending the settlement of wage and other differences. The operators are reported to have considerable coal on hand.

Sullivan—A suit to test the question of whether a landowner conveys oil and gas rights when he sells the coal under his land has been filed in the Circuit Court here by the Sullivan Gas & Oil Co. which has leased land, to drill for oil and gas but owners of the coal under the land have also begun drilling for oil.

Vincennes—The Indian Creek Coal Mining Co., operating the largest mine in Indiana, claims the hoisting record of the state, having in eight hours hauled to the surface 3104 tons, beating the mine's previous record by one ton.

ILLINOIS

Harrisburg—The route for the Miners' Examining Board of Illinois for the month of April is as follows: Spring Valley, Apr. 2; Canton, Apr. 3; Peoria, Apr. 4; Danville, Apr. 9; Pana, Apr. 14; Springfield, Apr. 15 and 16; Staunton, Apr. 17; Breese, Apr. 23; Belleville, Apr. 24; Eldorado, Apr. 26; Duquoin, Apr. 29; Herrin, Apr. 30.

Ottawa—Twelve hundred men are idle as a result of closing down the coal mines at La Salle, Peru, Oglesby, Jonesville, and Cedar Point. This shut down was caused by an over-stocked market, many big consumers fearing a strike having stored many tons of coal.

Peoria—The Illinois coal operators on Apr. 3 refused to grant the demands made by the miners and presented a counter-petition to the latter containing clauses which not only lower the present scale of wages, but which provide for easier working conditions as a means of decreasing the cost of production.

Chicago—Five hundred English, Welsh, Irish and Scotch miners who had been employed for some time in Illinois and Indiana coal fields left Chicago Apr. 2 on a special train for Halifax, Nova Scotia, where they will embark for their old homes. They are taking advantage of a shut down in the mines to visit relatives across the sea.

MISSOURI

Midway—A 14-ft. bed of coal was recently discovered on the Newlin lease of the American Zinc, Lead & Smelting Co. The coal was first encountered at a depth of 28 ft. and continued to a depth of 42 ft. It is said to be one of the biggest deposits ever found in the Joplin district.

OKLAHOMA

Coalgate—Old No. 3 mine recently made a record by hoisting 819 tons of coal in one day. This is the most that has been taken out of that mine in years. Long ago, however, it had a record of over 1000 tons.

TEXAS

Wichita Falls—It is planned to have a demonstration in this city on Apr. 21 protesting against the treatment given "Mother Jones" during the Colorado coal strike. It is affirmed that 10,000 or more men from the north of Texas and Oklahoma will be in town for this occasion.

MONTANA

Red Lodge—The Northwestern Improvement Co. has made arrangements to proceed with the work of developing the big body of coal under the west bench, and active operations will be commenced in June. This new field will be developed by shafting and tunneling, and beds Nos. 2 and 3 will be tapped. It is anticipated that development of the mine, and placing it in a position for production, will probably consume a period of about three years.

FOREIGN NEWS

London, England—On Apr. 2 all of the coal miners in Yorkshire, numbering 17,000, had left the mines when the last of the notices to quit work had expired. The men demand the introduction of a minimum wage scale. Stocks of coal at the pitheads are only sufficient to last about one week, at the expiration of which time those industries depending on Yorkshire collieries for fuel will be seriously hampered.

PERSONALS

Thomas L. Lewis recently stated unequivocally that he would not again be a candidate for any office in the United Mine Workers of America. He would not give any explanation for his decision.

Roger Martin, superintendent of the Vulcan Coal Co. recently returned home from the Hospital in Roanoke, Va., where he underwent an operation for an abscess in the side. He is now able to attend to his work.

E. B. Coolidge, who has been coal and coke agent for the Wheeling & Lake Erie R.R. Co. has been transferred to Chicago with the position of general western agent. His former headquarters were at Cleveland.

B. F. Robertson, for many years connected with the mercantile department of the Consolidation Coal Co., and lately general manager of stores, for that concern has resigned. He has not announced his plans for the future.

Joseph Yannis, vice-president of the United Mine Workers District No. 1, was recently held up by two masked highwaymen near his home in Wilkes-Barre and robbed. The highwaymen, however, only secured \$11 in cash and a gold watch.

I. P. Mullen and E. L. Halbert, superintendent and mine foreman at the Royal works of W. J. Rainey, were recently arrested on charges of violating a mine law which specifies that bore holes shall be kept 3 ft. ahead of the coal in narrow mine workings.

Gordon B. Late, recently purchased the entire interest of the Irvington-Late Coal Co. and will conduct the business under the name of the Gordon B. Late Coal Co. This firm now has 800 acres of Kittanning coal located on the Hardman branch of the Baltimore & Ohio R.R. in Preston County, W. Va.

Arthur Nealee, of Pittsburgh, will be general manager and superintendent for the recently organized Montour Coal Co. which has leased what are known as the Illinois Colliery Co. mines located at Springfield, Auburn, Virden, and Girard in Illinois. Provided the wage question is settled satisfactorily these mines will be operated at an early date.

Matt. Yurkonis was recently granted a verdict in the Brooklyn Federal Court of New York for \$50,000 against the Delaware, Lackawanna & Western R.R. Co. for personal injuries received on July 6, 1911. His injuries were received in a combined explosion of gas and powder in a mine at Luzerne, Penn. This is one of the largest verdicts ever rendered a miner for personal injuries.

Edward Devoy, one of the best known coal men in the Middle West, announced his retirement as president of the Devoy & Kuhn Coal & Coke Co. on Apr. 1, to engage in business for himself, under his own name, with offices in the Equitable Building, St. Louis. Mr. Devoy organized the Devoy & Feurborn Coal Co. in 1885, but was active in coal trade circles for many years previous to that. That company was succeeded by Devoy & Kuhn.

RECENT COAL AND COKE PATENTS

Boiler Cleaner. E. H. Reiter, Elgin, Ill. 1,085,357, Jan. 27, 1914. Filed Nov. 20, 1912. Serial No. 732,526.

Derrick for Mines. J. E. Jones, Carneyville, Wyo. 1,085,208, Jan. 27, 1914. Filed Jan. 29, 1913. Serial No. 745,017.

Gas Producer. P. G. Schmidt, Olympia, Wash. 1,086,229 Feb. 10, 1914. Filed Feb. 15, 1913. Serial No. 748,757.

Mechanical Stoker. G. B. Rait, Minneapolis, Minn. 1,085,630, Feb. 3, 1914. Filed May 15, 1912. Serial No. 697,428.

Automatic Boiler Cleaner. A. A. Olson, Riverside, Ill. 1,086,307, Feb. 3, 1914. Filed Nov. 15, 1912. Serial No. 731,471.

Coal Handling Apparatus. F. F. Joseph, Chicago, Ill. 1,086,536, Feb. 10, 1914. Filed Jan. 6, 1913. Serial No. 740,271.

Fuel Saver. J. T. McKee, St. Johns, New Brunswick, Can. 1,086,834, Feb. 10, 1914. Filed Dec. 23, 1912. Serial No. 738,342.

Steam Boiler Furnace. G. S. Gallagher, New York, N. Y. 1,085,859, Feb. 3, 1914. Filed Aug. 13, 1910. Serial No. 577,006.

Stoker for Underfeed Furnace Grates. F. E. Davis, Morgan Park, Ill. 1,085,248, Jan. 27, 1914. Filed Sept. 4, 1912. Serial No. 718,545.

Emergency Plug for Boiler Tubes. A. T. Anderson, Camden, N. J. 1,085,519, Jan. 27, 1914. Filed Feb. 10, 1913. Serial No. 747,490.

Safety Lock for Self-Dumping Mine Cages. W. J. Phelan, New Salem, Penn. 1,085,297, Jan. 27, 1914. Filed Apr. 12, 1913. Serial No. 760,734.

Process of Treating Soft or Bituminous Coal and the Like. W. A. Ayres, Hazleton, Penn. 1,086,503, Feb. 10, 1914. Filed Apr. 17, 1913. Serial No. 761,822.

Apparatus for Treating Soft or Bituminous Coal for the Separation of Slate Therefrom. W. A. Ayres, Hazleton, Penn. 1,086,502, Feb. 10, 1914. Filed Apr. 17, 1913. Serial No. 761,821.

Coal Breaker and Cleaner. G. W. Borton and J. L. Hiller, assignors to Pennsylvania Crusher Co., Philadelphia, Penn. 1,086,129, Feb. 3, 1914. Filed May 12, 1908. Serial No. 432,488.

CONSTRUCTION NEWS

Whitesburg, Ky.—Representatives of the Slemple Consolidated Coal Co. recently announced that a million dollar coal operation would be started near Craftville.

Springfield, Ill.—The Cora Coal Co. recently placed a contract for the erection of a new tippie to take the place of the one recently destroyed by fire at their mine near this city.

Benton, Ill.—A large new mine is to be opened on the outskirts of Benton during the coming summer by the Middle Fork Mining Co. This firm is incorporated for \$200,000, and owns 1660 acres of coal land east of the city.

Meyersdale, Penn.—The mining plants at Jerome and Boswell, owned by the United Coal Co. interests, will be improved and other ventures started after the receivership of the owning company, the American Water Works Co., has been concluded.

Sturgis, Ky.—The West Kentucky Coal Co. has let to the Alloway Lumber Co. the contract for the construction of 10 new houses at its No. 1 mine and 15 houses at No. 9. The lumber company has placed the material on the ground, and work will shortly begin on the new houses.

Hazard, Ky.—The Hazardtown Coal Co. recently organized with a capital of \$100,000 will begin work Apr. 10 on a first class mining plant immediately below Hazard where it will develop 1000 acres of choice coal lands. W. M. Jones, of Barbourville, Ky., will be manager of the new operations.

Barbourville, Ky.—A railroad surveying crew has been working between this place and Manchester, Clay County, Ky., for several weeks, and it is understood that the plan is to extend the proposed Cumberland Northern R.R. from Barbourville to Manchester, the company having already acquired a right of way.

Buffalo, N. Y.—The Buffalo By-Product Coke Co., organized in New York some months ago, has broken ground for a plant near the Lackawanna Steel Co.'s property. The gas will be sold to the Lackawanna company and the coke will be handled by M. A. Hanna & Co., of Cleveland, which is interested in the Buffalo Union Furnace Co.

Chattanooga, Tenn.—The Durham Coal & Iron Co. plans to construct by-product coke ovens in blocks of 30 to 60, with a view to future additions. These will consume about 800 tons of slack coal daily, and 5,000,000 cu.ft. of gas will be sold. The initial expenditure will be approximately \$1,000,000.

Penny, Ky.—The Long Fork Coal Co. will begin by Apr. 15, it is announced, a mammoth coal operation near Penny on Long Fork Creek to be reached by a new five mile branch of the Baltimore & Ohio R.R. At least seven openings will be made. The building of a good sized industrial city will be begun at once. Eight to ten million dollars will be expended in the work.

Whitesburg, Ky.—Three coal operations are to be started within a short time at the mouth of Boone's Fork. The Roberta Coal Co. contemplates an extensive plant a short distance up Boone's Fork, where it will expend a large sum to establish a first-class plant. At Mater, at the mouth of Boone's Fork, the Boone's Fork Coal Co. is now making preliminary surveys preparatory to starting building operations at which 500 men will be put to work. Following this the Consolidated Coal Co., one mile below the mouth of Millstone Creek, will begin operations shortly on another big operation.

NEW INCORPORATIONS

Mount Vernon, Ohio—The Eastern Kentucky Coal Co. has increased its capital stock from \$1000 to \$500,000.

Seattle, Wash.—The Beacon Coal Mines Co. of Seattle has been organized with a capital of \$1,000,000. The incorporators are A. L. Knouse, V. C. Brown, and John F. Dore.

Middleport, Ohio—The River View Coal & Mining Co. has been organized with a capital of \$5000. The incorporators are W. A. Brown, Emil Sauer, Laura Brown, W. L. Engler and Laura Engler.

Knoxville, Tenn.—The Royal Coal & Coke Co. has amended its name to the Royal Consolidated Coal Co., and increased its capital from \$100,000 to \$300,000. The incorporators are H. S. Pless, W. A. Pless, J. W. Goons, G. A. Atchley, and Ben. A. Morton.

Springfield, Ill.—The Montour Coal Co. has been organized with a capital of \$50,000 to manufacture, sell, and ship coal and other minerals, also, manufacture and sell by-products thereof. The incorporators are Wm. L. Patton, Henry L. Patton, and H. R. Hall.

Fairmount, W. Va.—The Fairmount-Lincoln Coal Co. has been organized for the purpose of mining coal, with a capital stock of \$150,000. The incorporators are C. H. Waggener, John G. Pritchard, Carl Riggs, and W. S. Black, all of Fairmont, W. Va.

Huntington, W. Va.—The Litz-Smith Coal Co. has been organized with a capital of \$40,000 to mine coal. The incorporators are A. L. Litz, of Tazewell, Va., R. I. Smith, of Huntington, W. Va., J. B. Agee, J. G. McGuire, and W. D. Spicer, of Logan, W. Va.

Accoville, W. Va.—The H. B. Summers Coal Co. has been organized with a capital stock of \$20,000, all of which has been paid in. The incorporators are M. A. Summers, Helen and May Summers, and Harry J. Summers, of Bridgeport, Ohio, and H. B. Summers, of Accoville.

Charleston, W. Va.—The Warrior Coal Co. has been incorporated with an authorized capital of \$100,000. The incorporators are planning an early development of 400 to 500 acres of coal in McDowell County adjoining the operations of the Berwind-White Co., with a tippie at War, W. Va.

Piedmont, W. Va.—The Cheat River Coal Co. has been incorporated with a capital of \$500,000. The officers are A. R. Balcom, pres., J. C. Mackley, secy. and A. R. Balcom, mgr. and constructing engineer. This firm will mine coal and

manufacture coke. It will invest about \$70,000 for machinery and plant, and expects to award the contracts for the above between Apr. 1 and May 30.

Duquoin, Ill.—Incorporation papers for a new railroad in Williamson County have been filed with the circuit clerk. The new road will extend from Fredonia, on the Paducah branch of the Illinois Central R.R., to Reeves, on the Johnston City branch of the same road, and will be known as the Fredonia and Reeves Ry. The incorporators are officials of the Illinois Central R.R., who expect to use the road almost exclusively for coal traffic.

INDUSTRIAL NEWS

Winchester, Ky.—Capt. J. G. Jones is negotiating with Eastern interests for the lease of about 1000 acres of coal land which he owns on the Big Sandy River.

Connellsville, Penn.—The Duquesne Coal & Coke Co. has purchased 250 acres of coal at Independence, in Washington County, at a price in excess of \$100 an acre.

Stone, Ky.—The Alburn Coal Co. is opening two new mines and will make a large increase in its output beginning Apr. 15. It will put 100 extra men to work. Fifty additional miners' houses will also be built.

Winchester, Ky.—Green A. Combs, of Montgomery Creek, in Perry County, has sold a tract of about 1100 acres of coal land in Clay County to Henry Martin, of Winchester, for \$22,000. The tract is located near Manchester, Ky.

Heller, Ky.—The Henry Clay Coal Co., has increased its coal output from 75 to 100 cars per day and proposes other increases from time to time. It will start another operation in close proximity to the present one the coming summer.

Bristol, Tenn.—The Clinchfield Coal Corporation has contracted with the Seaboard Air Line Ry. Co. to deliver to that firm from the mines in Russell County, Va., 900,000 tons of steam coal. This fuel is to be delivered as it is needed.

Wolf Creek, Ky.—The Wolf Creek Coal Co. which recently started a coal operation here will begin the shipping of coal soon and follow it by increases until a big output is reached. Over 200 miners' houses have been completed, most of which are now occupied.

Herrin, Ill.—Another mining school has been opened by the Miners' and Mechanics' Institute of this state at Herrin, under the direction of E. C. Lee, a well known mining engineer, formerly of Kingston, Penn. The work of the Institute has been made possible recently by act of the Legislature providing ways and means for establishing local schools of this character throughout the state.

Peoria, Ill.—At a meeting of the Executive Board of the Illinois Mining Institute, held at Peoria, Apr. 1, it was arranged that the May meeting of the Institute would be held in Peoria, May 14, 15 and 16. The program will be announced later. Information in connection with the work of the Illinois Mining Institute can be had by writing to Martin Bolt, secretary and treasurer, 1526 South College St., Springfield, Ill.

Waynesburg, Penn.—A deed has been filed in the Greene County Court whereby J. V. Thompson, of Uniontown transfers 8000 acres of coal land in Perry Township to the St. Paul Coal Co., of Pittsburgh. This is the largest single transfer ever placed on record in Greene County. The property is that which was reported as being sold by Mr. Thompson to H. C. Frick. The consideration is given as \$1.

Chicago, Ill.—The Link-Belt Co., manufacturers of the Link-Belt silent chain drive for the transmission of power, elevating and conveying machinery, locomotive cranes, power house conveyors for coal, ashes, etc., announces the opening of an office in Detroit, Michigan, in Room 911, Dime Bank Building. L. W. Longman, formerly connected with the Chicago and Indianapolis works of the Link-Belt Co., has been placed in charge.

Washington, D. C.—The U. S. Civil Service Commission announces an open competitive examination to and including May 11, 1914, for the following positions, open to men only: Mining Engineer at a salary of \$2400 to \$4000 per year; Mine Statistician at a salary ranging from \$1800 to \$2400 per year; and an Assistant Engineer of Mine Tests, at a salary of \$1800 to \$2400 per year. Parties interested in any or all of these positions should write the U. S. Civil Service Commission, Washington, D. C., for Circulars Nos. 367, 369 and 368, respectively.

Coal Trade Reviews

General Review

Customary spring activity in anthracite. Bituminous at a standstill, consumers showing no disposition to enter the market. Indications point to a declining market unless there is a rigid curtailment.

The anthracite trade is moving along briskly under the stimulus of abundant orders for April delivery. Tidewater business is particularly active, large quantities of coal going into the New England market, with indications that this will continue for two or three months at least. An increase of 25c. per ton in the April retail circular on the prepared grades at New York, as compared with last year's schedule, has created some hesitancy in the local situation there, but the opening business is about normal.

The Eastern bituminous market is at a complete standstill, with no orders, plenty of coal available, and the volume moving under contract away below normal. Concessions are necessary to avoid demurrage, as the market is absorbing coal slowly and buyers are inclined to postpone negotiations. A feeling of hopelessness pervades the trade as competition is close, and it looks like a declining market later.

Production in the Pittsburgh district is at something less than half capacity, there is no recognized circular, and consumers are instructing operators to discontinue shipments until stocks can be reduced; there is no business being done on new contracts, and the new season's schedule has not been announced. The lack of uniformity in operating, pending the fixing of a new wage scale, is aggravating the situation further, and the general outlook is not encouraging.

Although practically all of the Ohio mines are now closed, and neither side making any overtures for a settlement, the market still fails to develop any firmness. The final mine outputs are being delivered, and it is generally thought that most consumers now have a full two-months' supply. The formal opening of lake navigation a week ago Friday has found this business to be equally dull and heavy, because of the excess supply at the head of the lakes and the uncertainty in labor circles. A large number of inquiries are reported at the Hampton Road piers, prices are stationary, and there was a heavy dumping; the curtailment in the union fields, however, has failed to create any unusual activity.

There is a noticeable anxiety over the labor situation in the Middlewestern field, as indications are now pointing to more serious trouble than was anticipated. As yet, however, the market has failed to respond to this condition, even with the added inducement of the customary spring discount. One of the best features of the situation is the large inquiry on contracts, but operators are hesitating to negotiate because of the uncertainty in the labor problem.

EASTERN MARKET

BOSTON

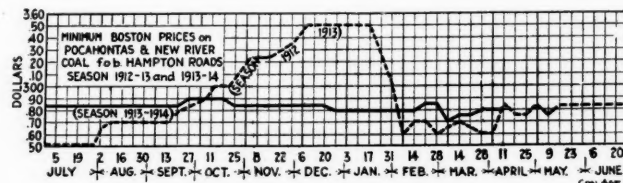
Movement of Pocahontas and New River way below normal and the trade shows rather a pessimistic tone. Unusually large volume of coal at Hampton Roads and market cargoes here are absorbed only with difficulty. Large reserve stocks in New England. Pennsylvania grades dull and heavy receipts of anthracite are expected.

Bituminous—The volume of Hampton Roads coals being applied to contract is way below normal and there is practically no spot demand whatever. At the same time most of the shippers are committed on marine transportation contracts and are therefore obliged to load vessels as they arrive. The market here is absorbing coal very slowly and in order to free cargoes of demurrage the distributors have to make such material concessions that new business and renewals as well are being considerably affected. Buyers are more than ever disposed to postpone and it certainly looks like a declining market later. The threatened Central Pennsylvania strike is regarded here as a flash in the pan affair and practically no interest is shown in it. With 175,000 to 200,000 tons reported standing at the three Hampton Roads ports it is not surprising that the trade here shows a pessimistic undertone.

Large reserve stocks are the rule at practically all the

industrial plants, and especially those equipped with auxiliary water power, which is the heaviest in several years and there is no doubt the effect on coal consumption in those sections will be very marked for at least two or three months.

There are no new features in the market for Pennsylvania grades. With practically all the anthracite transportation engaged in moving domestic sizes, Pennsylvania coals are only incidental at tide-water at this time of year. The business is confined to special requisitions and not much is heard in a general way. All-rail there is only a fair movement with a lot of close competition for what new business offers. Prices on the popular grades are being held more or less rigidly and with the level so high and Hampton Roads coals so easy it is only natural many buyers here should turn back this year to the southern coals. It takes a high-grade Pennsylvania coal to withstand some of the low prices that are made to move distress cargoes at the various distributing points.



Anthracite—A heavy amount of April coal is coming forward to dealers all along the New England coast. The ice at the Kennebec and Penobscot rivers is just at the point of going out and soon shipments will be on in earnest. The long-awaited Apr. 1 has arrived and now the sales agents are wondering where business is to come from when present orders are filled. The outlook is dull for the summer.

Boston prices were reduced 75c. on all sizes except egg on which the reduction is only 50c. This makes egg now the same price as stove. The list is as follows:

Broken.....	\$6.50	Shamokin.....	7.50
Egg.....	7.25	Franklin.....	8.50
Stove.....	7.25	Bituminous.....	\$4.65@4.90*
Nut.....	7.50	Screenings.....	3.00@3.25*
Pea.....	\$5.50		

*Higher figure effective after Oct. 1

Bituminous at wholesale is quoted about as follows:

	Clearfields	Cambria Somersets	Georges Creek	Pocahontas New River
Mines*.....	\$0.95@1.50	\$1.25@1.65	\$1.67@1.77	
Philadelphia*.....	2.20@2.75	2.50@2.90	2.92@3.02	
New York*.....	2.50@3.05	2.80@3.20	3.22@3.32	
Baltimore*.....			2.85@2.95	
Hampton Roads*.....				\$2.80@2.85
Boston.....				3.63@3.73
Providence.....				3.60@3.78

*F.o.b. †On cars.

NEW YORK

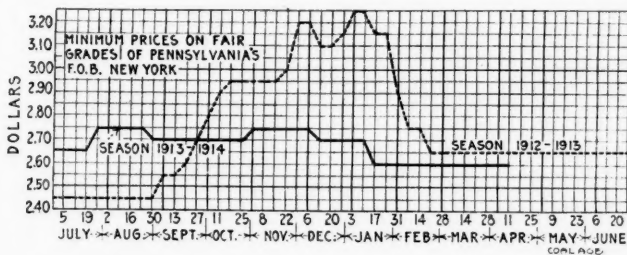
Interest of the bituminous agencies concentrated on the labor negotiations. Some business in contracts. Note of hesitancy in the anthracite trade due to the change in opening retail circular.

Bituminous—The New York soft-coal market is at a complete standstill. There is no demand, no orders, and plenty of coal on hand at all tide-water points. The entire attention of the trade seems to be concentrated on the labor trouble, and the situation is, of course, hinging to a certain extent upon the outcome of the different conferences now being held. If there is an important suspension in the bituminous regions, there will undoubtedly be a shortage of coal, and on the other hand, if operations are not restricted, the trade is facing a poor summer. In fact, there is a note of hopelessness prevailing in the trade regardless of which way the situation ultimately works out. The operators who will be shut down feel that the others in the nonunion fields will be able to keep the market well supplied and at the same time be the principal beneficiaries.

Some interest is still being shown in contracting. The conservative old-line companies holding out for last year's figures, probably have about half their expiring business renewed, with the balance still hanging fire. Other producers, willing to make concessions no doubt have more than this closed up. The spot market is not notably changed, and continues the same as for the past several weeks, although

there is probably little or no business being negotiated at these figures: West Virginia steam, \$2.50@2.60; fair grades Pennsylvania, \$2.60@2.70; good grades of Pennsylvania, \$2.70 @2.80; best Miller Pennsylvania, \$3.10@3.15; Georges Creek, \$3.15@3.25.

Anthracite—The feature of the New York hard-coal market is the new retail price schedule of 25c. per ton on the prepared grades above that for last year. It is stated that 10c. of this increase is made to cover the new Pennsylvania state tax on anthracite, and the balance to provide for increased labor costs, such as the advance granted the boat captains during the winter. A portion of it will also be absorbed by the dealers, as it has been a generally accepted fact for some time that the retail trade has been working on too small a margin of profit. There appears to be some uncertainty as to whether this 25c. increase will be carried through each month and added to the winter circular also; it is reported at some points that the customary 10c. addition will not be made to the April circular on the first of May.



As a result of this increase, there has been some hesitancy on the part of buyers, particularly in New York proper, but as a rule the hard-coal business is about the same as usual during this month. The prepared grades are particularly active all rail, the steam sizes continue short at the upper ports, and rather long at the lower ports. We quote the New York market on the following basis:

	Upper Ports		Lower Ports	
	Circular	Individual	Circular	Individual
Broken.....	\$4.60		\$4.55	
Egg.....	4.85	\$4.85	4.80	\$4.75@4.80
Stove.....	4.85	4.85	4.80	4.80
Chestnut.....	5.10	5.10	5.05	5.05
Pea.....	3.55	3.55	3.50	3.35@3.50
Buckwheat.....	2.80	2.80@2.90	2.50@2.75	2.35@2.75
Rice.....	2.30	2.30@2.40	2.00@2.30	1.90@2.30
Barley.....	1.80	1.80@1.90	1.70	1.45@1.70

PHILADELPHIA

Activity still marks the anthracite trade. Mining in full operation, and all sizes moving off promptly. Bituminous market shows little or no signs of improvement. Little fear of trouble with miners anticipated.

Anthracite—The second week of the spring anthracite business finds the trade moving along under the impetus of abundant orders for all domestic sizes, and a good market for the small or steam sizes but a season of mild weather will find much of this coal going into stock. No. 1 buckwheat seems to be finding the best market, with rice second; pea coal has already felt the effect of milder weather conditions, as evidenced by the fact that the individual operators still find it necessary to concede ten or fifteen cents from the so called circular prices to create a market.

The tidewater business is particularly satisfactory. Large quantities of coal are going to the New England market, and business from this end looks promising for at least two or three months. It is understood that the far Eastern points are rapidly resuming navigation and before the middle of the month, few if any will be inaccessible. The outlook for tidewater trade is bright. Ruling prices are as follows:

	Circular	Individual
Broken.....	\$4.25	\$4.35 @ 4.50
Egg.....	4.50	4.50
Stove.....	4.50	4.60
Chestnut.....	4.75	4.75
Pea.....	3.25	3.10 @ 3.15

Bituminous—While the market as a whole may be characterized as weak, yet there seems to be a tendency toward an improvement. The labor agitation had little effect on the local market, either in the way of added demand, or advanced prices, and what coal has been placed has mostly been on contracts. Prices continue on about a parity with the previous week.

BALTIMORE

Big gain in export coal trade is looked for. Prices firm but market listless. Contracting season draws to close in satisfactory manner.

A considerable improvement is anticipated in the export

trade that will somewhat offset the otherwise dull market. Spain, Italy, Mexico, Cuba and South American Atlantic ports are making inquiries of importance. Chartering is such that April will probably see a gain over the same period of last year. March witnessed an increase of nearly 2000 tons.

While the general coal trade is rather lifeless, prices hold quite firmly. West Virginia gas coals vary between 75 and 85c., and steam fuels are selling at the mines at from 95c. to \$1. Pennsylvania lower grades readily command \$1 to \$1.15, and best grades from \$1.30 to \$1.40. The closing of the contract season finds the majority of April business signed up.

A continuance of cool weather the past week caused some late buying of anthracite by householders with short supplies. The spring business as a rule, however, will be deferred until after the local retail coal exchange sets the new schedule. Considerable interest is felt in the local trade in a city government plan to purchase coal in bulk instead of by department lots. The specifications are rather exacting and a number of coal firms may hesitate to bid as a result.

CENTRAL STATES

PITTSBURGH, PENN.

No market for coal following settlement of wage scale, with some mines entirely closed and others operating part capacity. Many consumers have ordered shipments curtailed or suspended. Prices nominal. Connellsville coke softer, with uncovered consumers buying prompt lots instead of contracting. Production and shipments decreased.

Bituminous—The coal market became flat immediately it became known that there would be no general suspension on account of wage-scale differences. On behalf of the Pittsburgh district it was announced that there would be no suspension, except such closing as was forced by lack of demand. This closing has been rather pronounced. Nearly half the total capacity is temporarily represented in mines closed except for cleaning up work, while mines nominally in operation are running at greatly reduced rates, and shipments from Pittsburgh district mines since Apr. 1 have easily averaged below 50% of capacity.

There is no recognized market price for coal. Prior to Apr. 1 there had been cutting of the regular list to the extent of 10@20c. a ton and such prices could still be found now in all probability if consumers sought them, but instead they have been disposed to instruct operators to discontinue shipments until they can liquidate at least a portion of the stocks they accumulated in expectation of a general suspension. A number of contracts expired Apr. 1 and these must in time be renewed, but at the moment there is no disposition on the part of consumers to negotiate. It is not settled, of course, what prices operators will eventually quote on contracts but their general attitude is that of adhering to the former list, which is now nominally the market, though shaded as to prompt business: Slack, 90c.; nut and slack, \$1.05; nut, \$1.25; mine-run, \$1.30; ¾-in., \$1.40; 1¼-in. steam, \$1.50; 1¼-in. domestic, \$1.55, per ton at mine, Pittsburgh district.

Connellsville Coke—The market is quiet and somewhat softer in general tone. Coke operators recognize that iron-market conditions are unfavorable, at least temporarily, and that active furnaces are more likely to blow out than idle furnaces to blow in. The only activity in the past few days has been in prompt lots, which went at \$1.95 generally for first-class grade. The purchasers, however, were consumers who had been expected to buy for the month of April as a whole, or even for the second quarter, and the attitude of buyers is that the shorter periods they engage themselves for the better, as they expect to buy at lower figures as time passes. We quote: Prompt furnace, \$1.90@2; contract furnace, \$2; prompt foundry, \$2.40@2.50; contract foundry, \$2.40@2.50, per ton at ovens.

The "Courier" reports production in the Connellsville and Lower Connellsville region in the week ended Mar. 28 at 360,018 tons, a decrease of 4062 tons, and shipments at 347,490 tons, a decrease of 22,040 tons. Production appears to have exceeded shipments by 12,528 tons.

BUFFALO

Too much bituminous on track, particularly at terminal points. Anthracite about normal. Country delivery hampered by muddy roads. Coke very heavy.

Bituminous—There is practically no regular market to report and will not be any for some time. The output has been cut down materially by suspensions here and there, but

the action is not uniform. Some mines are already starting up, after a short shutdown, and it looks as if others would follow in a short time, as the men are anxious to work and the operators will not curtail production.

This means a market continually overstocked and the consumer making his own prices. For quite a long time there has been little coal shipped, except on contract, that was not urged on the consumer just to get rid of it. As a rule, the consumers are not only much overstocked, but there is a large amount of coal on track, much of it on car service. It would take a month to clean up this surplus and make a firm market possible. At the same time there is demand for slack, though it is not what it was. It is well that it is not selling very brisk, for it is hard to get it while so much mine-run and sizes are awaiting sale. Such a condition pulls the trade to pieces badly, though it makes the Allegheny Valley slack as high in price as Pittsburgh, in spite of the lower freight. The general outlook is not encouraging as a whole.

Quotations remain weak and uncertain on the basis of \$2.80 for Pittsburgh lump, \$2.70 for three-quarter, \$2.55 for mine-run, and \$2.25 for slack, including Allegheny Valley, although other sizes of this coal are about 25c. lower than Pittsburgh.

Coke—As anticipated last week the report of a possible advance in foundry coke has not materialized. The trade is as dull as ever and any increase of output would be disastrous. Consumption is not increasing, and prices continue on the basis of \$4.50 for 72-hr. Connellsville foundry.

Anthracite—There is a good April trade in all branches of the business, although country jobbers complain of bad roads that interfere with deliveries. The excess of egg coal continues and it is predicted that some new plan for breaking coal will have to be adopted sooner or later. The loading of anthracite for lake shipment continues slowly, more than 20 cargoes now being afloat. Not much more will be done at present, as there is little demand for it at upper-lake ports and the prospect is for a late opening of the lake trade. Vessels will hold back as long as possible, as there is no iron ore for down shipment yet.

TOLEDO

The trade here is waiting future developments. Price lists are entirely off and everything unusually quiet and dull. Opening of navigation.

There is no perceptible change in Toledo. With a strike on, the conditions here are little different from what they have been for many weeks. Everything is decidedly dull. During the week it has been impossible to move the small quantity of track coal, held in the local yards, even at big concessions. Consumers either stocked sufficient to last during a brief suspension or will depend upon West Virginia coal. It is thought that the majority have enough accumulated stock for at least a month or six weeks. The railroads, have at least a two months supply on hand and one of the largest factories announced that they had enough to last until the end of June.

The demand for domestic, which was the life of the trade during the past six weeks is now entirely dead.

The length of the Ohio strike is the determining factor in local conditions. Most of the operators are of the opinion that it will last for some time.

Navigation was formally opened on Wednesday. Considerable coal has already arrived here for lake shipment. Large tonnages are held for this purpose on the east side awaiting the opening of the Pennsylvania bridge.

Prices are quotable as follows:

	Pocahontas	Kanawha
Domestic lump.....	\$1.60	\$1.40
Egg.....	1.60	1.30
Nut.....	1.40	1.25
3 lump.....	1.25	1.15
Mine-run.....	1.25	1.10
Slack.....	....	0.65

No prices on Hocking, Jackson, Pomeroy, Massillon, Pittsburg and Cambridge.

COLUMBUS

Trade at a standstill. Practically no coal produced and the demand weak. No indications for a renewal of the wage agreement have appeared.

As anticipated, practically all of the operators in this state closed their mines Mar. 31 and they will remain closed until a satisfactory wage agreement is signed. As a result after the first two days of the week there was no production of consequence. Both operators and miners have been playing a waiting game and no move has been made toward a renewal of the conferences. Neither side is sure of their ground as the passage of the mine-run law has seriously complicated matters.

While the policy committee of the United Mine Workers of America announced that the miners would be willing to work pending negotiations on the wage agreement, the operators decided to close down their mines. They have not yet taken any action to test the constitutionality of the mine-run law and cannot until after the referendum period is over which is about May 20. In the meantime the attorneys will canvass the situation and outline a plan of action to be followed.

So far no effort has been made toward putting tipples and plants in shape to comply with the new law. This work will require several months and an expenditure of \$2,000,000 to \$3,000,000. The operators appear to be well organized and are standing solidly against resuming work before a number of disputed points are settled. The market is in such a condition that a suspension of 60 days would not hurt anybody and would result in cleaning up stocks nicely. It is freely predicted that when work is resumed coal will be sold at a higher figure than prevailed since the first of the year. It is believed the cost of production under the new law will be advanced fully 8 to 10c. per ton.

The indications for the lake trade are not very promising. Reports from the Northwest show there is still a considerable tonnage on the docks of the upper lake ports. There will not be much demand for lake tonnage before the middle of the season.

What quotations are being made in the Ohio fields are as follows:

	Springfield	Franklin Co.	Clinton	W.Va.
Domestic lump.....	\$2.07	\$2.30@2.40	\$2.12	
Steam lump.....	1.97		1.97	
Egg.....		2.30@2.40		\$3.65
Mine-run.....	1.87	2.15@2.25	1.87	3.30
Screenings.....	1.67	1.85@1.95	1.62	

CLEVELAND

Lake coal shipping started last Friday at Huron. The suspension in Ohio failed to bring any appreciable benefit to the market and prices rule on the low level of the last few weeks.

Every commercial mine in Ohio closed down Tuesday night, and most of them will remain closed for some time. Although consumers realized the threatened suspension was not a myth, they did not come into the market with a rush; much stocking has been done in this district and little may be expected in the way of improvement in the near future.

The last coal mined in Ohio under the old contract has reached the markets, but it is not expected it will sell readily. The local trade has been carrying between 500 and 600 cars of coal, which will not be moved in less than two weeks. Prices continue low because operators and jobbers must sell coal to avoid car service.

Anthracite is coming to retail dealers and as many of the retail yards have large stocks of soft coal they are somewhat crowded.

Lake shipping began Friday when a small steamer and barge left Huron with coal for St. Clair River ports. Another steamer and barge cleared Saturday for river points. Coal is arriving for lake shipment in small quantities. The B. & O. is accepting lake coal only when the vessel is waiting at Lorain to load. The B. & O. machines at Lorain went in operation Apr. 10.

Coal shippers are not actively working among vessel owners. The situation at the mines in Ohio and parts of western Pennsylvania is so uncertain they cannot be sure of having coal and there will be no demand from the upper lake ports for at least sixty days. It is said among shippers that additional chartering of vessel capacity will not be done for another three or four weeks.

The spot market is quotable as follows:

	Pocahontas	No. 8	Middle District	Fairmount	Youghiogheny
Lump, 3 in. \$2.75@2.90*	\$1.90@1.95	\$1.80@1.85		\$1.90	\$2.25
Egg..... 2.75@2.90*					
Mine-run.. 2.55@2.60*	1.85	1.80@1.85			2.15
Nut.....	1.90	1.80			2.00@2.05*
Slack..... 1.25*	1.75	1.70			1.90

*For coal shipped or en route.

CINCINNATI

Closing down of Ohio mines stirs local demand. Trade looks to West Virginia and Kentucky for tonnage. River movement steady with all harbors, down to New Orleans, well supplied.

The trade here is now passing through a transitional period and the market is rather quiet. The demand for shipments from Kentucky and West Virginia has been greatly emphasized since the closing of the Ohio mines last week. Operators in the Southern districts are watching with the

keenest interest the events now taking place north of the river, and while the majority of the dealers here believe that the situation will be relieved in the near future, Southern producers are making every effort to increase their production.

The rail movement through here is about as heavy as the lines North can take care of. This will be greatly relieved, however, by the diversion of C. & O. coal to the Hocking Valley for distribution in the central and northern parts of the state. Every harbor from Cincinnati to New Orleans is well supplied, the river movement having been steady.

In some quarters it is said that the domestic trade is at a complete standstill, which condition will likely continue for some time, as retail dealers show little disposition to put in stock for next winter. Producers are sanguine that dealers will begin calling for shipments within the next few weeks which will have a tendency to relieve the market.

DETROIT

Improved demand and outlook is brighter. Activity on contracts for the new year.

Bituminous—The local situation has cleared up somewhat, and the indications are brighter for a good healthy business the coming season. The demand has quickened and a more optimistic feeling prevails. There has been a great deal of activity in contracting particularly, and considerable business is said to have been closed at profitable figures. Operators are showing no particular anxiety to close contracts, and are exercising some care in taking only what business they want. Some small premiums have been offered for light consignments of track coal, but this is rather the exception than the rule.

Coke—The situation is practically unchanged with the demand only fair for this time of the year. Indications point to increased business shortly. Connellsville is quoted at \$3 with Sement Solvay at \$3.25, and gas house at \$2.90, all f.o.b. ovens.

HAMPTON ROADS

Week's shipments heavy. Dumpings for month of March more than one million tons. Prospects for heavy movement during April.

The dumpings over all piers at Hampton Roads have been good and the demand for coal is much better than it has been for some time.

Prices remain stationary. From the number of inquiries in the market for coal for prompt movement indications are that shipments will be heavy during the current month.

Foreign shipments for the week have been to Naples, St. Lucia, Cuba, Montevideo, Canal Zone, Georgetown, Coronel, Port Morant, Ceara and Manoz. In addition to the foreign movement the coastwise shipments have been heavy.

The Norfolk & Western Ry. at Lamberts Point made a new record for fast loading on Mar. 28 when they dumped 7751 tons of cargo and bunkers into the S.S. "Middlesex," this coal being put aboard in the short space of 4 hr. and 10 min. The best previous record out of this port being 4 hr. and 50 min. for a like quantity of tonnage.

Shipments of coal out of Hampton Roads for the month of March amounted to over one million tons of which quantity the Norfolk & Western Ry. at Lamberts Point dumped 532,525 tons, the Chesapeake & Ohio Ry. at Newport News 231,633 tons and the Virginian Ry. from Sewalls Point 222,803 tons.

LOUISVILLE

Continued mild weather stops the domestic movement and business is at a low ebb. The steam market is equally weak. Suspensions in other districts have had no effect as yet.

In spite of the stiffening which should normally follow a suspension of operations in other fields, the market in this territory is extremely weak, owing largely to the practical cessation of the movement of the prepared grades. Retailers report that there is no demand whatever, and as yet they have shown no inclination to begin stocking in anticipation of the summer business. The expected suspension in western Kentucky will not improve things appreciably, as there is simply no market for coal at this time.

The steam market is also slow, despite the scarcity of screenings which might be expected to follow a weakness in the domestic market. This is due to the inactivity in many industries, resulting in a lessened need for fuel and low prices, ranging from the rock-bottom figure of 35c. for western Kentucky nut and slack to 75c. or thereabouts for the better grades of eastern Kentucky, with few sales. It is reported that 6-in. block has been offered as low as 85c., indicating a market so quiet that it might be called quite dead.

SOUTHERN AND MIDDLE-WESTERN

BIRMINGHAM

Lump coal and steam coal very quiet. Furnace and foundry coke show little change and blacksmith coal is normal. Car supply satisfactory. Spring prices on Cahaba coal.

With the coming of summer weather, all spot business on lump coal has vanished, and while spring prices are now prevailing, business, so far, has been short of expectations. However, the next thirty days will show heavy bookings of lump coal for summer and fall shipment. Following are prices on standard Cahaba nut, No. 2 lump and fancy lump.

	2x5 Nut	No. 2 Lump	Fancy Lump
April.....	2.00	2.25	2.50
May.....	2.10	2.35	2.60
June.....	2.20	2.45	2.70
July.....	2.30	2.55	2.80
August.....	2.40	2.65	2.90
September.....	2.50	2.75	3.00
October.....	2.50	2.5	3.00
November to March.....	2.75	3.00	3.25

These prices are based on business being normal. Should the winter be cold they will advance, but if mild they would drop.

The steam coal business is far from being satisfactory, but the operators are expecting an improvement within the next ten days or two weeks. There is little or no change in the furnace or foundry coke market, it still being very quiet. Blacksmith coal is about normal. Furnaces report only small sales of pig iron for last week, with prices around the \$11 mark for 2 Foundry f.o.b. Birmingham. The car supply is satisfactory.

INDIANAPOLIS

Fair domestic trade due to cool weather requiring continuance of furnace fires. Steam grades moving about the same. Industrial demand improving and some storing still being done. Prices hold steady.

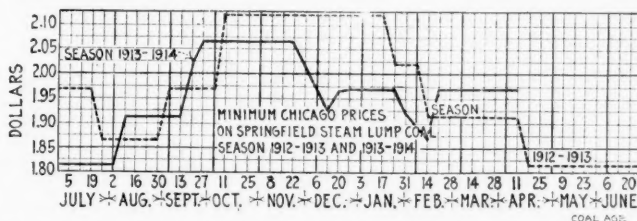
The weather continues cool and there is still a fair trade in domestic coals in Indiana. The demand for steam grades continues about the same; an improvement was expected but the industrial situation has not picked up. However, building operations have a start now and this will mean more activity generally. It is also the time of year when the automobile factories make a good showing. While these are far from being at full capacity, yet, they show considerable improvement over their winter schedule. Some other lines are also more active.

All this, added to the storing of coal by the larger buyers, because the new wage agreement is not yet signed, gives Indiana mines fairly active going. It is noted in this city that some consumers of domestic grades are laying in stocks of coal while they are sure they can get it. There is considerable inquiry concerning contracts for next year, but some hesitancy on the part of operators in quoting old prices during the pending uncertainties. Some of the mines have closed for repairs and a few hundred miners have taken advantage of this and of the delay in reaching a wage agreement and have left for Europe for a few weeks' vacation. Some mines were closed Apr. 1 that the miners might celebrate the anniversary of the eight-hour-day law. Prices continue generally unchanged.

CHICAGO

Summer discounts and labor troubles fail to stimulate business. Considerable activity in contracting with new business at last year's figures.

The expected movement toward a large storage of coal in preparation for a mine suspension did not materialize and a flat and dull market is the result. The general reduction in prices for the summer did not seem to aid the situation to any appreciable extent.



Contracting continues to feature the smokeless coal market, with the larger portion of the Chicago business all

closed although there is still some which is not as expeditious as was expected. Satisfactory conditions prevail in spot business with a number of concerns entirely sold up for delivery of prepared coal in April and May and more than half sold up on June and July delivery. Prices are steady at \$1.25 for mine-run up to Aug. 1 and \$1.40 after that date. For lump and egg the price is \$1.60 for April, \$1.70 for May, \$1.90 for June, \$2 for July and \$2.25 for August and probably the balance of the year.

Conditions have been unusually dull with regard to the Hocking situation as a result of the energy of dealers who aided their customers in filling up before the mine suspension. Franklin County, Cartersville and Harrisburg mines are awaiting the outcome of the labor situation, and they have provided their contract customers with as much coal as they could be induced to take. The belief is that there will be no serious interruption to mining. Similar conditions prevail in Indiana with an expected shut down of from two to three weeks; it is understood that the market is well enough stocked to withstand this.

Prevailing prices in Chicago are:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump.....	\$1.45 @ 1.35		\$1.50 @ 1.40	\$1.40 @ 1.35
1/2 inch.....	1.30 @ 1.25	\$1.20 @ 1.15	1.35 @ 1.30	1.30 @ 1.25
Nut.....	1.25 @ 1.20		1.30 @ 1.25	1.25 @ 1.20
Mine-run.....	1.15 @ 1.10	1.10 @ 1.05	1.15 @ 1.10	1.15 @ 1.10
Nut, pea and slack.....	0.85 @ 0.80		0.90 @ 0.85	0.75 @ 0.70
Coarse slack.....	0.75 @ 0.70	1.00 @ 0.95	0.80 @ 0.75	0.65 @ 0.60

Coke—Connellsville and Wise County, \$5@5.25; byproduct egg, stove and nut, \$4.45; gas house, \$4.25.

ST. LOUIS

Labor situation takes an unexpected turn for the worse and some anxiety now evident. Nearly all mines shut down. Prices unchanged but tending to advance.

There is a feeling of anxiety in the local coal trade circles as to the future developments in the labor situation in the Illinois field. In only a few instances has there been much storage coal bought by the steam plants here but the developments of the past few days have caused a great deal of anxiety as indications are that things will not be as smooth as was anticipated by the railroad interests. These latter were advising the public all the time that there would be no strike, but in the meantime they were shipping all the coal they could get for railroad storage purposes, taking advantage of the cheap prices that prevailed on account of the rumor that there would be no protracted shut down.

Some of the mines in the Standard district are working but only a few. There are no mines being operated in the outer districts, as far as can be learned. The circular prices as quoted in the last issue are practically the same, with the exception of screenings. The market at the close of last week on Cartersville screenings was 90 to 95c., with a tendency to bring \$1 and only a little offered. The Standard market was about 65 to 70c., with a tendency to go to 75 and 80 cents.

There is no washed coal on the market, and nut coal is somewhat scarce from all fields. Egg has moved more freely than lump, so that such mines as have coal on track have nothing but lump.

KANSAS CITY

Market generally steady. Increased production of cheap steam-shovel coal causing a readjustment of trade conditions.

Demand for lump is at a standstill, while steam coal is showing improvement. The market is generally steady, though Cherokee lump is badly off because of competition with the steam-shovel operations in the Pittsburgh and other fields. With the arrival of good weather, the steam-shovel mining is progressing at an increased rate, with the result that shaft operators are finding themselves at a marked disadvantage. The cost of shovel mining is much less than by shaft, though that method does not allow as large an output as the latter. Operators mining Cherokee lump are finding it impossible to compete with the steam shovels and the situation is causing a good deal of uncertainty. It appears as if the shaft operators will be able to sell only surplus demand which cannot be cared for by the shovel mines.

FOREIGN MARKETS

GREAT BRITAIN

Mar. 27—With the approaching of the Easter holidays and heavier chartering of late, the outlook is more promising. Prices are approximately as follows:

Best Welsh steam.....	\$4.35	Best Monmouthshires.....	\$4.09
Best seconds.....	4.20	Seconds.....	3.90
Seconds.....	4.08	Best Cardiff smalls.....	2.60
Best dry coals.....	4.14	Seconds.....	2.52

The prices for Cardiff coals are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are net f.o.b. Newport; both exclusive of wharfage, and for cash in 30 days.

FOREIGN TRADE OPPORTUNITIES

The United States Consular Service reports opportunities in foreign coal markets as follow; complete details regarding different items can be obtained on application to the Bureau of Foreign and Domestic Commerce, Washington, D. C., by giving numbers:

A foreign business man informs an American consular officer that he is anxious to introduce American coal into the country in which he is located, and has just entered into negotiations with a Government official in reference to supplies of American coal. There is a disposition to buy such product provided the quality compares favorably with that of Cardiff coals. If American firms can compete it is believed that 200,000 tons of coal can be disposed of. Translation of the specifications which cover the purchase of Government supplies accompanied the report, and can be obtained by interested firms from the Bureau of Foreign and Domestic Commerce.

—No. 12,790.

The Bureau of Foreign and Domestic Commerce is in receipt of a communication from a trade organization in the United States stating that one of its officials will make a trip to a European country in several months for business purposes. He desires to take advantage of this opportunity to introduce American coal into the country in question. He states that he has good connections in the market and believes that the time is opportune for establishing a permanent trade in this article.—No. 12,777.

PRODUCTION AND TRANSPORTATION STATISTICS

ANTHRACITE SHIPMENTS

Anthracite shipments for March and the first three months of the current year as compared with last year were as follows:

	March		3 Months	
	1914	1913	1914	1913
Phila. & Reading.....	936,304	976,712	2,698,223	3,399,293
Lehigh Valley.....	926,701	829,502	2,419,133	3,066,782
Cent. R.R. N.J.....	750,381	665,856	2,018,522	2,240,293
Del. Lack. & West.....	668,038	532,247	1,860,529	2,217,917
Del. & Hudson.....	446,135	562,440	1,475,406	1,782,988
Pennsylvania.....	585,190	429,211	1,547,408	1,496,825
Erie.....	660,924	700,388	1,900,534	2,073,542
Ont. & Western.....	191,030	212,932	542,131	642,236
Total.....	5,164,703	4,909,288	14,461,886	16,919,876

COAL SECURITIES

The following table gives the range of various active coal securities and dividends announced during the week ending Apr. 4:

Stocks	Week's Range			Year's Range	
	High	Low	Last	High	Low
American Coal Products.....	84 1/2	84	84 1/2	86 1/2	84 1/2
American Coal Products Pref.....	104 1/2	104 1/2	104 1/2	106	104 1/2
Colorado Fuel & Iron.....	34 1/2	31 1/2	31 1/2	34 1/2	28 1/2
Colorado Fuel & Iron Pref.....			155		
Consolidation Coal of Maryland.....			102 1/2		
Island Creek Coal Com.....	48	47	48		
Island Creek Coal Pref.....	87 1/2	86 1/2	86 1/2		
Lehigh Valley Coal Sales.....	170	150	165		
Pittsburgh Coal.....	21 1/2	21	21	23 1/2	17 1/2
Pittsburgh Coal Pref.....	92 1/2	91 1/2	92	93 1/2	86
Pond Creek.....	18 1/2	17	17		
Reading.....	166 1/2	164 1/2	165 1/2	172 1/2	161 1/2
Reading 1st Pref.....	88	88	88	89	87 1/2
Reading 2nd Pref.....	88 1/2	88 1/2	88 1/2	93	90
Virginia Iron, Coal & Coke.....	50	50	50	52	40
Bonds	Closing Bid Asked			Week's Range	
				or Last Sale	Year's Range
Colo. F. & I. g. n. s. f. g. 5s.....	97	98 1/2	98	98	91 1/2 99
Colo. F. & I. gen. 6s.....	108	110	107 1/2	June '12	76 1/2 82
Col. Ind. 1st & coll. 5s. g. u.....	78 1/2	Sale	78 1/2	Mar. '14	73 70
Cons. Ind. Coal Me. 1st 5s.....	89 1/2	73	73	Mar. '14	89 80
Cons. Coal 1st and ref. 5s.....	89 1/2	92	89	Mar. '14	89 80
Gr. Riv. Coal & C. 1st g. 6s.....	91		99 1/2	Feb. '14	99 1/2 90 1/2
K. & H. C. & C. 1st s. f. g. 5s.....		98 1/2	102 1/2	Apr. '06	
Pocah. Con. Coll. 1st s. f. 5s.....	91		93	93	93 93 1/2
St. L. Rky. Mt. & Pac. 1st 5s.....	88 1/2	89	88	88	84 88
Tenn. Coal gen. 5s.....	78	82 1/2	80 1/2	Mar. '14	77 82
Birm. Div. 1st consol. 6s.....	103	Sale	103	103	97 1/2 103 1/2
Tenn. Div. 1st g. 6s.....	102	103	101 1/2	Mar. '14	101 1/2 103
Cah. C. M. Co. 1st g. 6s.....	101 1/2	103	101 1/2	102	101 102 1/2
Utah Fuel 1st g. 5s.....	101		101 1/2	Mar. '14	101 1/2 101 1/2
Victor Fuel 1st s. f. 5s.....		75	80	May '13	
Va. I. Coal & Coke 1st g. 5s.....	93	Sale	93	93	92 1/2 95

No Important Dividends were announced during the week.